



Report to the Chairman, Subcommittee
on National Parks and Public Lands,
Committee on Interior and Insular
Affairs, House of Representatives

November 1991

RANGELAND MANAGEMENT

BLM's Hot Desert Grazing Program Merits Reconsideration



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The Honorable Bruce Vento
Chairman, Subcommittee on National
Parks and Public Lands
Committee on Interior and
Insular Affairs
House of Representatives

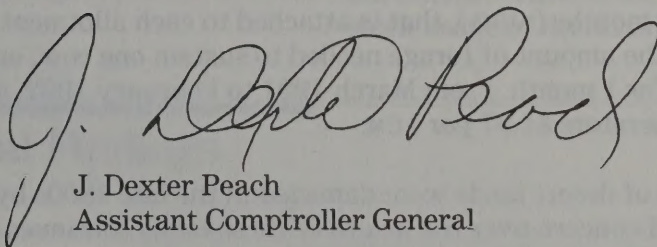
Dear Mr. Chairman:

This report responds to your request that we examine the federal livestock grazing program in the Southwest desert areas managed by the Department of the Interior's Bureau of Land Management (BLM). The report focuses on the environmental and budgetary costs and benefits of the program and BLM's program management.

Unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from the date of this letter. At that time, we will send copies to the appropriate congressional committees and the Secretary of the Interior. We will also make copies available to others upon request.

This work was performed under the direction of James Duffus III, Director, Natural Resources Management Issues, who may be reached on (202) 275-7756. Other major contributors to this report are listed in appendix IV.

Sincerely yours,



J. Dexter Peach
Assistant Comptroller General

Executive Summary

Purpose

The effect of domestic livestock grazing on public lands is controversial. Historically, public lands were damaged through overgrazing, and some believe that this damage is continuing. Conversely, the livestock industry believes that the public lands are in better condition now than they have been in the past 100 years. This debate is particularly important in the nation's so-called hot deserts—the Mojave, the Sonoran, and the Chihuahuan—because of the fragile nature of the hot desert ecosystems and the long-term nature of recovery for most areas once damage occurs.

Concerned about this issue, the Chairman, Subcommittee on National Parks and Public Lands, House Committee on Interior and Insular Affairs, requested that GAO review the federal grazing program in the hot deserts as administered by the Department of the Interior's Bureau of Land Management (BLM). GAO examined (1) the environmental and budgetary costs associated with livestock grazing in desert areas, (2) the benefits resulting from this activity, and (3) BLM's management of livestock grazing in the hot deserts.

Background

Almost 20 million acres of BLM land located in Arizona, California, Nevada, New Mexico, and Utah are situated within the boundaries of America's hot deserts. Within these deserts, about 1,000 livestock operators hold permits allowing them to graze livestock on approximately 1,050 parcels of land (referred to as allotments). Permits are issued for up to 10 years and specify the maximum amount of forage, measured in animal unit months (AUMs), that is attached to each allotment. An AUM is defined as the amount of forage needed to sustain one cow, one horse, or five sheep for 1 month. From March 1991 to February 1992, BLM is charging operators \$1.97 per AUM.

Many acres of desert lands were damaged in the late 1800s by overgrazing, and concern over the health of these lands continues today. BLM is responsible for managing, maintaining, and improving the public lands and for ensuring that overgrazing does not recur. BLM's policy is to determine the proper grazing level by monitoring the impact of the current number of livestock on BLM's allotments and to adjust levels accordingly.

Results in Brief

Current livestock grazing activity on BLM allotments in hot desert areas risks long-term environmental damage while not generating grazing fee

revenues sufficient to provide for adequate management. GAO found evidence of damage occurring on BLM lands as well as evidence of livestock grazing's adverse impacts on several wildlife species. Some damaged lands may take decades to recover if they recover at all. Grazing revenues returned to the U.S. Treasury do not cover current livestock grazing management costs, and, as previous GAO reports have shown, BLM's current level of spending is insufficient to perform all necessary range management tasks.

According to the most current data available, the economic benefits derived from livestock grazing on BLM lands in the hot desert areas are minimal. From a national perspective, the number of cattle and sheep in hot desert areas represents a small fraction of national totals. At a local level, BLM documents indicate that local economies do not depend on public lands ranching for economic survival. The primary economic benefits accrue to about 1,000 operators who hold livestock grazing permits in these areas. However, many of these operators generate little net income from ranching the public lands. According to the operators, an important benefit they do receive is the ability to maintain a traditional ranching lifestyle they enjoy. Conversely, other public lands users highly value the use of desert lands for environmental preservation and recreation.

GAO found that BLM lacks the staff resources needed to collect and evaluate data measuring the impact of livestock grazing on many desert allotments. Without these data, BLM is not in a position to assess livestock usage of desert allotments and change usage as needed.

Principal Findings

Environmental and Budgetary Costs

Historic grazing practices have exacted a high environmental cost on hot desert ecosystems, and GAO found examples of lands that continue to be degraded by current grazing practices. Furthermore, research shows that livestock grazing can have a detrimental impact on certain hot desert wildlife species. The response of hot desert lands to rest from livestock grazing is varied. Some areas, particularly those near water sources, have rebounded quickly after livestock grazing has been discontinued, while other areas may take decades or longer to heal.

Grazing livestock on public lands in the hot deserts also involves budgetary costs. BLM estimates that livestock grazing management costs for the eight districts responsible for administering hot desert allotments totaled about \$2.8 million during 1989. In total, these district offices collected almost \$4.0 million in grazing fees during the year. However, under current law, no more than 37.5 percent (\$1.5 million) of the grazing fees collected are available to the Treasury to offset BLM management costs, resulting in a \$1.3 million shortfall. The remaining grazing fees collected are provided to state and county governments and to BLM for additional range improvement expenditures. Furthermore, as previous GAO reports have shown, at the current level of resources, many tasks needed to adequately protect the public lands used for grazing throughout the country are not being accomplished.

Economic and Noneconomic Benefits

The economic benefits received from livestock grazing hot desert public lands are minimal. The inventory of cattle and sheep in these regions from 1988 through 1990 represented no more than 1.6 percent and 3.0 percent, respectively, of national inventories. GAO believes these numbers overstate the number of livestock on BLM lands in the hot deserts because they are based on county inventory figures that include areas outside the hot deserts as well as private lands. BLM documents demonstrate that local economies are not dependent on public lands ranching. For example, according to BLM documents, animals raised for their meat make up 6.1 percent of the total dollar output of industries located in the Carlsbad, New Mexico, resource area. Of this figure, 0.4 percent are dependent on BLM rangeland. Likewise, the documents state that ranching in Clark County, Nevada, produces less than 0.03 percent of the county personal income and less than 1 percent of the total livestock sold in the state. Public lands ranchers state that, despite limited financial benefits, they highly value the traditional ranching lifestyle. Other public lands users prefer to use hot desert lands for purposes other than livestock grazing. For example, several studies estimated higher values for the land when used for the enhancement of wildlife than the value implicit in the grazing fee. Furthermore, some environmental groups have exhibited a desire to protect the desert ecosystems by purchasing properties with federal grazing permits that they believe have suffered environmental damage as a result of overgrazing.

BLM Lacks Data to Ensure Allotments Are Not Being Damaged

GAO found that BLM lacks the data to know if damage is occurring on many hot desert allotments and is not in a position to change an operator's authorized grazing level should a change be warranted. Questionnaires administered by GAO indicate that BLM is not monitoring the impact of livestock grazing on forage on 47 percent of the allotments located in hot desert areas. This includes several allotments that are known to have resource conflicts. For example, no monitoring data are being collected on a 450,000-acre allotment in California, which includes large areas of habitat for the Mojave desert tortoise, a threatened species. Furthermore, of the allotments for which monitoring data are being collected, BLM has not evaluated the data for 38 percent. Under current agency policy, BLM cannot change a permittee's grazing level to protect the land without this information except in emergency situations.

These data are not available largely because BLM lacks necessary staff resources to collect and analyze them. Most BLM offices indicate that staffing shortages are a problem, and GAO found a more than 20-percent reduction in range staff between 1983 and 1990. Currently, some range staff are responsible for managing up to a million acres of land.

Matters for Congressional Consideration

GAO believes that the high environmental risks and budgetary costs, low economic benefits, and management problems associated with livestock grazing on public lands in the hot deserts raise questions about the merits of the hot desert grazing program as currently conducted. GAO offers several policy options for consideration, including providing BLM greater flexibility to adjust the level of authorized grazing activity on hot desert allotments each season in accordance with forage availability.

Agency Comments

The Department of the Interior generally agreed with the facts presented in this report and concurred that livestock grazing on hot desert public lands warrants congressional consideration. It did, however, express some concerns with the options for revising desert grazing practices that GAO presented. Interior also noted that, until altered, it will continue to fulfill its present mandates. GAO recognizes that there are some trade-offs associated with all of its options; however, it continues to believe that each of the options merits consideration by the Congress.

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Abbreviations

AUM	animal unit month
BLM	Bureau of Land Management
EIS	environmental impact statement
FLPMA	Federal Land Policy and Management Act of 1976
PRIA	Public Rangelands Improvement Act of 1978

Introduction

1. Introduction
2. Background

The debate over desert grazing is a complex one, involving a variety of interests and values. The issue is not simply whether or not grazing should be allowed, but also how it should be managed. The debate is often framed in terms of the economic value of the land, but it also involves concerns about the environment and the welfare of the people who live in the area. The issue is particularly acute in the western United States, where grazing has been a traditional part of the economy for many years. However, in recent years, there has been a growing concern about the impact of grazing on the environment, particularly in the case of desert grazing. This report examines the issue of desert grazing, focusing on the economic, environmental, and social aspects of the debate. It also provides recommendations for how the issue should be managed.

At the center of this controversy is the Department of the Interior's Bureau of Land Management (BLM), which administers livestock grazing on about 107 million acres of public lands in 16 western states. Under the Federal Land Policy and Management Act of 1976 (FLPMA), it is the BLM's responsibility to provide "fair and equitable treatment" to the various interests in the public lands, while also protecting the land and the quality of the environment.

The grazing debate in America is often framed in terms of the economic value of the land, but it also involves concerns about the environment and the welfare of the people who live in the area. The issue is particularly acute in the western United States, where grazing has been a traditional part of the economy for many years. However, in recent years, there has been a growing concern about the impact of grazing on the environment, particularly in the case of desert grazing. This report examines the issue of desert grazing, focusing on the economic, environmental, and social aspects of the debate. It also provides recommendations for how the issue should be managed.

¹ An economic benefit is defined as a benefit that is realized in the form of a cash flow or a change in the value of an asset.

² The term "desert" is defined as a region that is arid or semi-arid, with very little rainfall and high temperatures. It is often used to describe the southwestern United States.

³ The term "public lands" refers to land that is owned by the federal government, the state government, or the local government. It does not include private land.

Introduction

The best use of America's public lands and of the resources they provide has been debated for decades. One of the most controversial issues in this debate is the use of the lands for domestic livestock grazing. Critics claim that grazing by domestic cattle and sheep is degrading these lands and that livestock grazing costs the American taxpayer more in terms of environmental damage and federal regulatory resources than it returns to the nation. Ranchers counter that livestock grazing is a viable use of public lands from which they earn income and provide a product to the American consumer. In addition, grazing advocates value the continuation of the ranching lifestyle in the West. They claim that although damage occurred in the past, the public lands are in better condition now than they have been in the last 100 years.

At the center of this controversy is the Department of the Interior's Bureau of Land Management (BLM), which administers livestock grazing on about 165 million acres of public lands in 16 western states. Under the Federal Land Policy and Management Act of 1976 (FLPMA), BLM is responsible for providing "harmonious and coordinated management of the various resources [of the public lands] without permanent impairment of the productivity of the land and the quality of the environment"

The grazing debate intensifies when it focuses on the fragile ecosystems of America's so called "hot" desert areas.¹ Encompassing the Mojave, Sonoran, and Chihuahuan deserts and spanning six southwestern states, these areas share the common characteristics of low rainfall, high temperatures, high evaporation rates, and sparse vegetation. In FLPMA, the Congress recognized parts of the Mojave and Sonoran deserts as a "total ecosystem that is extremely fragile, easily scarred, and slowly healed." A 1981 report by the President's Council on Environmental Quality states that livestock overgrazing has been the most potent desertification force,² in terms of acreage affected, in the United States.³ Many other researchers have also listed livestock grazing as one of many factors associated with the decline of America's hot deserts.

¹An ecosystem is defined as a system of mutual relationships between organisms and their environment.

²Desertification is defined as a change in the character of land to a more desertlike condition, including reduced biological productivity, accelerated deterioration of soils, and an associated impoverishment of human livelihood.

³David Sheridan, Desertification of the United States, Council on Environmental Quality (Washington, D.C.: 1981).

America's Hot Deserts

The United States has within its boundaries three so-called hot deserts: the Mojave, the Sonoran, and the Chihuahuan. Hot deserts are differentiated from cold deserts by average temperature, precipitation, and plant type. Figure 1.1 shows the general location of the United States' hot deserts. Identifying exact desert boundaries is difficult because scientists disagree about which plants and animals best characterize each desert, but general boundaries are known. Although all three hot deserts have low rainfall and high temperatures, each receives its precipitation in a different season and in varying distribution patterns, resulting in the growth of unique vegetation.

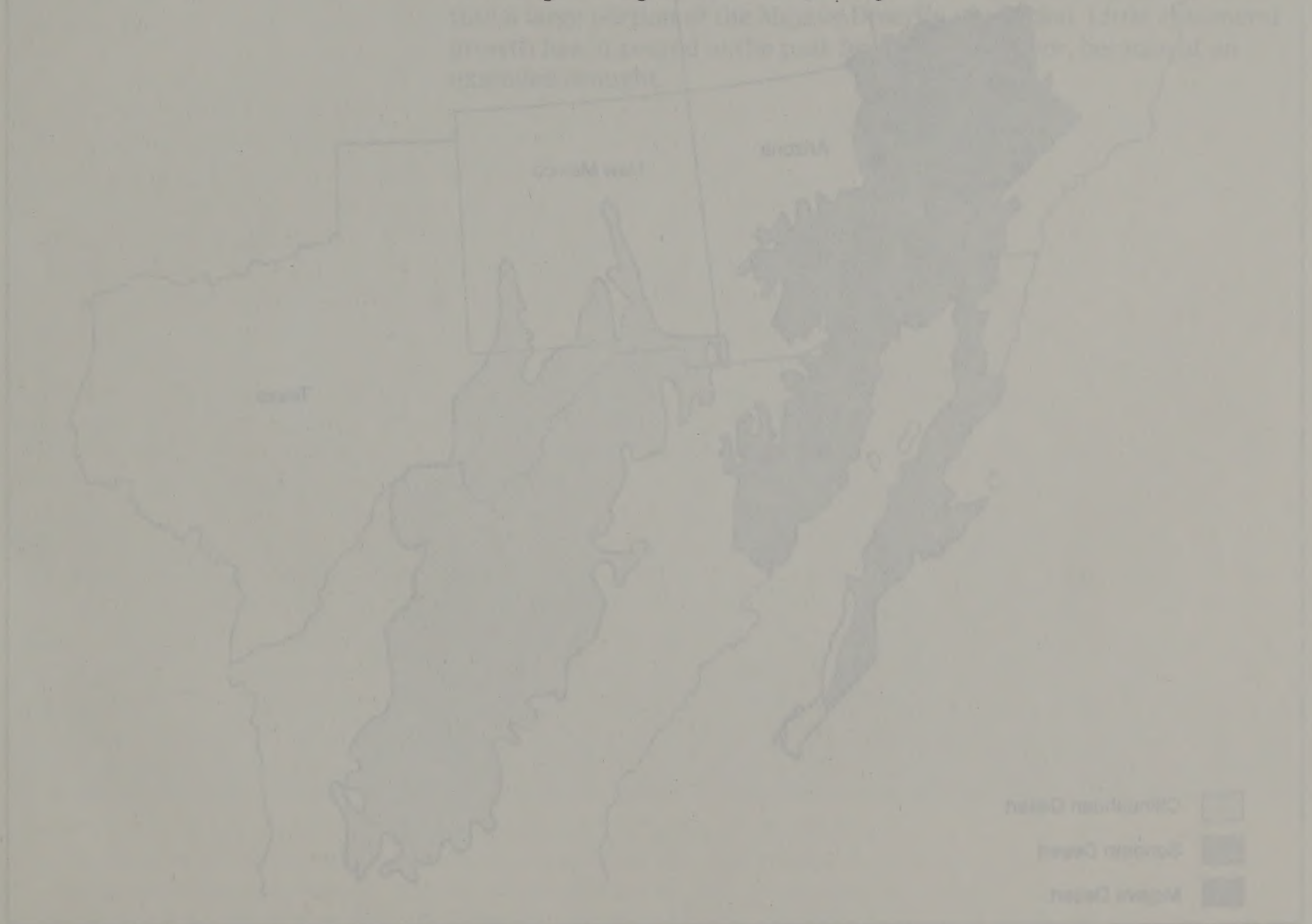
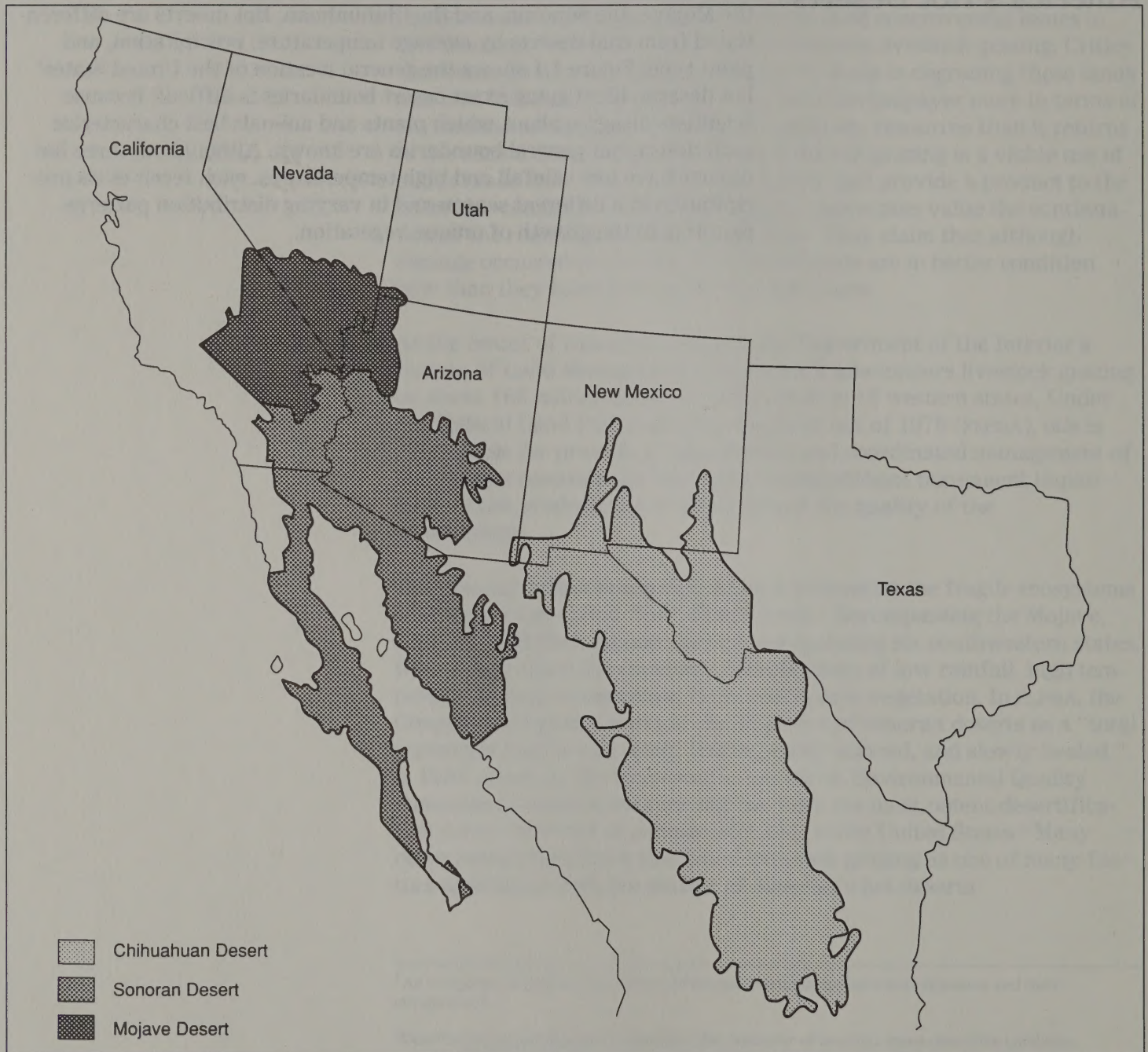


Figure 1.1: America's Hot Deserts



Source: GAO illustration based on Reference Handbook on North American Deserts, ed. G. L. Bender (Greenwood Press, 1980).

The northwesternmost hot desert, the Mojave, receives rain primarily in the winter; annual totals amount to less than 6 inches at most sites. Summer temperatures are among the highest in the nation, regularly approaching 120 degrees Fahrenheit. Figure 1.2 shows a typical Mojave Desert scene, including creosote bush throughout and a tall, spiny Joshua tree at the left. These are two of the Mojave's most common plants. In addition to these perennial plants that survive year-round, annual vegetation, which lasts only a season and must be regenerated each year from seed, blooms in the spring after the winter rainfall. Annual plant species, also called ephemeral vegetation, typically constitute a large portion of the Mojave Desert's vegetation. Little ephemeral growth has appeared in the past few years, however, because of an extended drought.

Figure 1.2: Mojave Desert Landscape, Beaver Dam Slope, Utah



Sandwiched between the Mojave and the Chihuahuan deserts, the Sonoran Desert receives both winter and summer rainfall totaling anywhere from 1.2 inches per year in the lowlands to 19 inches per year in the highlands. Winter rainfall is of longer duration and lower intensity than the thunderstorms that typify summer rainfall. The dual-season rainfall provides the Sonoran with a greater variety of plants than either of the other two hot deserts. Like the Mojave, the Sonoran Desert supports both perennial and ephemeral vegetation in years of good winter rainfall, but the Sonoran can also produce a small ephemeral bloom in the late summer and early fall if summer rains are sufficient. Figures 1.3 through 1.5 indicate the diversity of species found in the Sonoran. Figure 1.3 depicts the towering saguaro cacti unique to the

Sonoran Desert. They are surrounded by chollas, ocatillos, and other desert species. Figure 1.4 demonstrates the existence of grasses. The dominant species pictured is tobosa grass.

Figure 1.3: Sonoran Desert Plants Outside Wickenburg, Arizona



the other two hot deserts, its winters are cooler. The Chihuahuan Desert's higher rainfall and different soil type promote the growth of more grass than are found in the other two hot deserts. Figure 1.3 depicts Chihuahuan Desert grasses. Most of the vegetation in the Chihuahuan is perennial, and there is little to no ephemeral desert

Figure 1.4: Sonoran Desert Grasses Outside Wickenburg, Arizona



Figure 1.5 shows an area with a preponderance of creosote bush. Like the Mojave, the Sonoran has received little rain over the past few years, and ephemeral vegetation has been limited.

Figure 1.5: Sonoran Desert Landscape Outside Hope, Arizona



The Chihuahuan Desert, the easternmost in the United States, generally receives rainfall in the summer. Precipitation can vary from 8 to 12 inches per year and usually comes in the form of high-intensity thunderstorms. Because the Chihuahuan Desert lies at a higher elevation than the other two hot deserts, its winters are cooler. The Chihuahuan Desert's higher rainfall and different soil type promote the growth of more grasses than are found in the other two hot deserts. Figure 1.6 depicts Chihuahuan Desert grasses. Most of the vegetation in the Chihuahuan is perennial, and there is little to no ephemeral bloom.

Figure 1.6: Chihuahuan Desert Landscape, Las Cruces, New Mexico



The hot deserts are among the least productive grazing lands in the United States. An appraisal conducted in 1984 by BLM and the Department of Agriculture's Forest Service found that more than 160 acres of land were sometimes required to support one cow for 1 month in southern New Mexico, Arizona, southwestern Utah, southeastern California, and most of Nevada. The average rate in this area was 16 acres per cow per month. In contrast, BLM lands in eastern North Dakota, South Dakota, southeast Wyoming, and northern Nebraska require an

average of only 4.6 acres, or less than one-third as many acres, to support one cow for 1 month.

The hot deserts, with their scant rainfall, are harsh environments within which numerous wild plant and animal species live. Over time, these desert species have evolved elaborate survival systems to sustain themselves through years of drought. Plants have small leaves or leaf surfaces that are waxy or hairy and elaborate root systems that allow efficient use of water. Many mammals and reptiles, such as the desert tortoise, javelina (wild boar), and mule deer, are somewhat drought tolerant, and in some instances do not require large amounts of free-standing water because they receive liquid from the seeds and plants they eat. Many species are nocturnal, resting during the heat of the day and foraging for food only in the cooler nighttime temperatures.

Although desert inhabitants have adapted to the inherently harsh nature of their environment, America's hot desert ecosystems are being subjected to greater and greater stress that is making their inhabitants' survival more difficult. Since the nineteenth century, large numbers of people have moved westward, and urban development has spread rapidly in such areas as Phoenix, Los Angeles, and Las Vegas. Great numbers of livestock were introduced into the deserts during the mid- to late-1800s. The U.S. military currently uses large portions of the deserts for weapons testing. Recreational activity, particularly the use of off-road vehicles, has increased in recent years. All of these factors have changed the natural desert ecosystems in ways that many native plants and animals have not been able to adapt to. Table 1.1 shows the numerous plant and animal species that Interior's Fish and Wildlife Service or one of the five states encompassing the Mojave, Sonoran, and Chihuahuan deserts has listed as endangered or threatened or has identified as a candidate species that may warrant listing.⁴ (Texas has no BLM public lands and was therefore excluded from our study.)

⁴An endangered species is one determined to be currently in danger of extinction throughout all or a significant portion of its range; a threatened species is likely to become an endangered species within the foreseeable future.

Table 1.1: Endangered, Threatened, and Candidate Species in the Mojave, Sonoran, and Chihuahuan Deserts

	Mammals	Birds	Amphibians, Reptiles, and Fish	Invertebrates	Plants	Total
Mojave						
Federal						
Endangered	1	5	5	0	3	14
Threatened	0	1	2	1	1	5
Candidate	4	6	4	8	79	101
State	12	18	26	0	51	107
Sonoran						
Federal						
Endangered	3	3	3	0	4	13
Threatened	0	0	3	0	0	3
Candidate	11	9	10	3	11	44
State	6	25	13	0	0	44
Chihuahuan						
Federal						
Endangered	4	4	4	0	4	16
Threatened	0	0	6	0	1	7
Candidate	10	6	10	2	10	38
State	12	34	32	2	21	101

Source: GAO analysis of data obtained from BLM officials in hot desert states.

BLM Management of Public Lands in the Hot Deserts

BLM's management philosophy emphasizes decentralized control; as much authority and responsibility as possible are delegated to lower operating levels. Under this philosophy, staff located at 15 resource area offices are responsible for carrying out the day-to-day administration of BLM's public lands in the hot deserts. These 15 offices receive policy guidance from 8 district offices spread throughout 5 states. Tasks related to livestock grazing are carried out at the resource area level, primarily by range conservationists, with support from wildlife biologists, botanists, and soil scientists.

In response to our request, BLM identified almost 20 million acres of BLM-managed public lands within the hot deserts. Grazing on these lands is managed through 1,048 management units called allotments. Table 1.2 provides a breakdown of hot desert allotments and acreage by state and resource area.

Table 1.2: Public Lands in the Mojave, Sonoran, and Chihuahuan Deserts, by State and Resource Area

Acres in thousands			
State	Resource Area	Acres	Allotments
Arizona	Gila	162	38
	Kingman	1,792	68
	Lower Gila	3,544	119
	Phoenix	617	103
	San Simon	32	13
	Shivwits	531	21
Total		6,677	362
California	Barstow	945	16
	Needles	2,385	15
	Ridgecrest	1,594	23
Total		4,925	54
Nevada	Stateline	3,170	53
Total		3,170	53
New Mexico	Caballo	678	62
	Carlsbad	751	111
	Mimbres	2,712	330
	Socorro	458	50
Total		4,599	553
Utah	Dixie	337	26
Total		337	26
Total acres		19,708	1,048

Note: Totals may not add because of rounding.

Source: GAO analysis of BLM data.

Authorization to graze livestock on BLM allotments is granted through the issuance of grazing permits and leases.⁵ These permits were assigned to landowners who had historically grazed livestock on the public range before federal regulation. Today, some permits are still held by the livestock operators (or their families) to whom they were first assigned, while others have been transferred several times. Permits are renewable and are generally issued for 10-year periods but can be issued for a shorter time.

⁵Documents authorizing the use of public lands for livestock grazing are called permits or leases, depending on the section of the Taylor Grazing Act under which the grazing is authorized. For this report we will use the term "permit" exclusively.

Each grazing permit specifies the amount of forage—or forage preference—measured in animal unit months (AUMs), that is attached to each allotment.⁶ This amount includes active-use AUMs, approved nonuse AUMs, and suspended AUMs. Active-use AUMs are currently available for use, approved nonuse AUMs are currently available but have been elected for nonuse by the operator with BLM's approval, and suspended AUMs are being temporarily withheld from grazing by BLM. Livestock operators pay BLM a fee based on the number of AUMs grazed during the grazing fee year, which runs from March 1 through February 28. The grazing fee is calculated each year under Executive Order 12548, which adopted the grazing fee formula contained in the Public Rangelands Improvement Act of 1978 (PRIA). The grazing fee can be no less than \$1.35 per AUM and was calculated to be \$1.81 per AUM from March 1990 through February 1991 and \$1.97 per AUM from March 1991 through February 1992.

Livestock operators have the authority to graze up to the maximum number of active-use AUMs available in the allotment's preference each year; however, BLM may reduce active use temporarily because of drought, fire, or other natural causes, or to facilitate installation, maintenance, or modification of range improvements. Permits for the hot desert allotments that contain primarily annual vegetation, known as ephemeral allotments, have no preference listed. BLM decides on a seasonal basis how many AUMs may be grazed.

Since 1982, BLM's policy has been to adjust preference, either upward or downward, on the basis of the results of monitoring studies. Monitoring is defined in BLM regulations as the periodic observation and orderly collection of data to evaluate the effects of management actions and the effectiveness of actions in meeting management objectives. Specifically, BLM guidance lays out four parameters to be monitored in evaluating the effects of livestock grazing: (1) movement of an allotment's condition toward or away from management objectives (trend), (2) the amount of forage consumed and remaining on the allotment during the grazing season (utilization), (3) the actual number of livestock grazing on the allotment, and (4) the climatic conditions that existed during the grazing season. Collection and evaluation of these data are needed to decide whether current livestock grazing activities are meeting land management goals set by BLM. Because livestock operators have the authority to graze up to the maximum number of active-use AUMs allowed by the

⁶An AUM is defined as the amount of forage needed to sustain one cow, one horse, or five sheep for 1 month.

preferences for allotments except in emergency situations, BLM must ensure that active preferences are correct. Without sufficient monitoring data, BLM will not have the support it needs to change active preference levels, and overgrazing may occur.

Current Grazing Operations on BLM's Hot Desert Lands

Livestock grazing in the hot deserts generally involves cattle and sheep. For cattle, there are "cow-calf" and "steer" operations. In cow-calf operations, a base breeding herd of mother cows and bulls is maintained. The mother cows produce a calf crop each year, and some of these calves are kept as replacement animals. The rest of the calf crop is sold between the ages of 6 and 12 months, along with old or nonproductive mother cows and bulls. These operations are typically found on allotments with active-use preferences because operators can generally rely on being able to graze BLM land each year. Operations remain relatively stable, and operators can depend on a certain number of calves to sell.

Steer operations are seasonal—herds of steers and heifers are grazed from 3 to 9 months and then sold to feedlots or as breeding stock. Ephemeral allotments are conducive to steer operations. According to operators we interviewed, these allotments are used in two ways. First, operators can purchase steers and heifers in years when they believe there will be sufficient ephemeral forage for BLM to allow grazing. They purchase the animals at a low price, graze them on BLM lands for several months while they gain weight, and sell them at a higher price than they paid. Second, operators can contract with livestock owners to graze the owners' livestock on allotments for a fee. The fee is either a set amount per animal per month or a set amount per pound gained during the animal's time on the allotment. Steer operations are more risky than cow-calf operations because the forage may be insufficient to produce a weight gain. According to the operators, they must contract to purchase or lease livestock months in advance of forage growth without knowing if forage will actually be available.

Sheep operators also use ephemeral allotments. Sheep are placed on BLM lands to take advantage of the spring ephemeral bloom. The California Wool Growers' Association told us that 9 to 10 percent of the state's sheep utilize the Mojave Desert for approximately 70 days a year. Operators move the sheep through the allotments, and water is generally hauled to the animals once or twice a day. When forage is no longer available, operators take the sheep from the allotments and move them to other lands.

Legislation Governing Livestock Grazing on BLM's Hot Desert Lands

Livestock grazing has been an integral part of the western lifestyle since before the turn of the century. Settlers moving to the West brought cattle, sheep, and horses. By 1879 approximately 19 million cattle and sheep roamed the western United States. These livestock generally grazed the open range without restriction. Extreme droughts in the early 1890s killed many of these animals, and the livestock industry in the West was devastated. The land was heavily damaged, having been completely denuded of vegetation in many areas. Livestock grazing continued, however, and the federal government began regulating this activity on BLM lands in 1934.

The Taylor Grazing Act of 1934 was enacted to “stop injury to the public grazing lands by preventing overgrazing and soil deterioration, [and] to provide for their orderly use, improvement, and development . . .” This was the federal government’s first attempt to regulate livestock grazing on BLM land and called for the government to collect grazing fees from ranchers who used public lands.

Even under the Taylor Grazing Act, much of the public rangeland continued to deteriorate, leading the Congress to enact the Federal Land Policy and Management Act of 1976 (FLPMA). This legislation directed that the public lands be managed under multiple-use and sustained-yield principles. Multiple use is defined, among other things, as the utilization of the public lands in the combination that will best meet the present and future needs of the American people. It calls for the “harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment.” Sustained yield is defined as the achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the public lands consistent with multiple use. Under FLPMA, BLM was for the first time required to balance the needs of livestock operators with those of other users of public lands. In addition, FLPMA directed that public lands be retained in federal ownership and that their resources be inventoried on a periodic and systematic basis.

The Public Rangelands Improvement Act of 1978 (PRIA) reaffirmed a national policy and commitment to manage, maintain, and improve the condition of the public rangelands so that they become as productive as possible for all rangeland values. It directed the Secretary of the Interior to update, develop, and maintain, on a continuing basis, an inventory of range conditions and records of trends on BLM lands.

Objectives, Scope, and Methodology

Concerned about the condition of public lands in America's three hot deserts, the Chairman of the Subcommittee on National Parks and Public Lands, House Committee on Interior and Insular Affairs, asked us to identify the effects of BLM's livestock grazing program on public lands in these deserts. Specifically, we addressed three issues: (1) the environmental and budgetary costs of livestock grazing on BLM's hot desert lands, (2) the benefits derived from this activity, and (3) BLM's management of livestock grazing on these lands.

To determine the geographic scope of our review, we asked BLM officials to identify the allotments they believe to be located in the Mojave, Sonoran, and Chihuahuan deserts. They provided us with a list of 1,062 allotments located in Arizona, California, Nevada, New Mexico, and Utah and managed by 20 BLM resource area offices. We omitted five resource areas from the study because they each had fewer than five hot desert allotments, and we thereby reduced the final study scope to 1,048 allotments managed by 15 resource area offices. We visited 10 of these offices, which are collectively responsible for 87 percent (908) of the hot desert allotments covering 84 percent (16.5 million acres) of the hot desert areas. Appendix I lists the BLM field offices included in our study.

To address the environmental cost of livestock grazing in the hot deserts, we discussed the impacts of livestock grazing with a number of groups and individuals, including

- range and wildlife staff at BLM headquarters in Washington, D.C., and at 6 of the 8 district offices and 11 of the 15 resource area offices responsible for the administration of BLM lands in the hot deserts;
- officials from state government agencies, including the Nevada Department of Wildlife, the Arizona Game and Fish Department, the California Department of Fish and Game, and the New Mexico Department of Game and Fish;
- academicians in the fields of range science, agriculture, biology, botany, and ecology, from numerous universities, including Arizona State University, the University of Arizona, the University of California, the University of Nevada, Southern Utah State College, New Mexico State University, the University of New Mexico, and Duke University;
- representatives of several interested groups, including the Nature Conservancy, the California Native Plant Society, the Desert Tortoise Council, and the Wildlife Management Institute; and
- representatives from the livestock industry, including the National Cattlemen's Association and the Public Lands Council, the New Mexico

Cattle Growers' Association, the Arizona Cattlemen's Association, the California Wool Growers' Association, and the Washington County Cattlemen's Association (Utah).

These people recommended dozens of research studies regarding the impacts of livestock grazing on desert plant communities and wildlife, which we subsequently reviewed.

We visited each of the three deserts accompanied by BLM staff. Representatives of the livestock industry and other interested groups sometimes joined us. In addition, we visited several research institutes, including Interior's U.S. Geological Survey's Desert Laboratory in Tucson, Arizona, and the U.S. Department of Agriculture's Jornada Experimental Range in Las Cruces, New Mexico.

To address the budgetary cost of grazing in the hot deserts, we compared the costs of managing livestock grazing in the hot desert regions with the grazing fees collected from these areas. BLM could not provide us with management costs specifically related to the hot desert allotments, nor could it provide us with such data for the resource areas that manage these allotments. Management costs at the district level represent the best information available. Since these costs include both desert and nondesert allotments, management costs referenced in this report exceed the actual costs of managing desert allotments only. To maintain comparability, we obtained from BLM the grazing fees collected for the districts that are responsible for hot desert allotments.

To respond to the Chairman's request for information on the economic and other benefits derived from livestock grazing in hot deserts, we used two primary sources of information: Department of Agriculture livestock inventory statistics and grazing environmental impact statements (EISS) developed by BLM for the hot desert areas.⁷ To determine the contribution of hot desert livestock grazing to the national cattle and sheep industries, we asked BLM for the number of cattle and sheep that had grazed on the 1,048 hot desert allotments during the 1988 and 1989 grazing seasons (from March 1988 through February 1990). BLM could not provide this number, since it keeps aggregate records only in terms of AUMs sold, not numbers of livestock grazed. During the course of our review, livestock operators informed us that many livestock operations

⁷ An EIS is a document developed for use by decisionmakers in weighing the environmental consequences of a potential decision. According to BLM, an EIS should accurately portray potential impacts on the human environment of a particular course of action and of its possible alternatives. BLM wrote EISs regarding the impact of livestock grazing on all hot desert areas from 1978 to 1989.

The Environmental and Budgetary Costs of Livestock Grazing on BLM's Hot Desert Lands

Chapter 1 Introduction

depend on both public and private lands for survival. They believe that if grazing were prohibited on BLM lands, many ranchers would go out of business and the number of livestock affected would include not only those that grazed on BLM lands but those that grazed on private lands as well. Taking this mixed grazing pattern into consideration, we used county inventory data as a basis for determining the contribution of hot desert grazing to the livestock industries. We identified the counties located in the resource areas determined to have hot desert allotments and confirmed their identification with BLM resource area officials. Livestock inventory numbers for these counties were then obtained from the Department of Agriculture's National Agricultural Statistical Service and state agriculture departments.

To identify the benefits derived by local economies and individual ranchers from livestock grazing in the hot deserts, we depended heavily on grazing EISS completed by BLM from 1978 through 1989. These documents assess the contribution of livestock grazing to the local economies and address the issue of income received by public lands ranchers. While there are some isolated studies regarding economic impacts of livestock grazing in portions of the hot deserts, the EISS contain the most comprehensive and comparable data for all of the areas. We analyzed 12 of the 17 EISS covering the areas. These 12 EISS covered 83 percent of all hot desert allotments. We supplemented the EIS data with discussions with BLM officials and livestock industry representatives. For information about the noneconomic benefits associated with various hot desert public lands uses, we interviewed livestock operators and reviewed EISS and articles by other public land users.

To evaluate BLM's ability to manage livestock grazing on desert lands, we administered a questionnaire to 14 of 15 resource area offices responsible for hot desert allotments. The questionnaire asked for the number of allotments for which monitoring data were being collected, the types of monitoring data being collected, and the extent to which the monitoring data had been evaluated to establish preference levels.⁸ According to BLM policy, preference levels based on monitoring data are not required until 5 years after the completion of the EIS encompassing that resource area. Because the EIS for the Phoenix Resource Area was not completed until 1986 and preference levels were not required until 1991, we did not administer our questionnaire to this office.

⁸Resource area officials provided these data for all allotments located within the resource area, including those inside and outside the hot desert boundaries. Consequently, the questionnaire responses noted in chapter 4 represent BLM's progress in monitoring all allotments located within the resource area boundaries, not just hot desert allotments.

We supplemented the questionnaire with visits to 10 BLM resource area offices where we discussed livestock grazing management with BLM staff and reviewed the files associated with 81 hot desert allotments. We reviewed the files to determine whether monitoring data were being collected for the allotment and what uses were being made of the data. Because the size of the file review was small, we cannot project our findings to all hot desert areas, but the review did provide some case examples.

Our review was performed between April 1990 and August 1991 and was conducted in accordance with generally accepted government auditing standards. The Department of the Interior provided written comments on a draft of this report. These comments are presented and evaluated in chapter 5 and included in appendix III.

The Environmental and Budgetary Costs of Livestock Grazing on BLM's Hot Desert Lands

Among the factors to consider in evaluating the merits of any activity on federal lands are the environmental and budgetary costs. We found that domestic livestock grazing on BLM's hot desert allotments continues to impose the risk of long-term environmental damage to a highly fragile resource. In return, the grazing activity does not generate revenues to the U.S Treasury, in the form of grazing fees, sufficient to cover the costs of managing the grazing program. Historic grazing practices reduced the productivity and vigor of the hot desert ecosystems, and evidence suggests that current grazing practices continue to do so on some allotments today. Livestock grazing in hot desert areas also poses a threat to several threatened and endangered wildlife species. The ability of damaged desert lands to recover when rested from livestock grazing is a subject of much debate. However, research shows that while recovery in some areas around water sources can occur quickly, in other areas recovery could take decades, and in some areas the damage may be irreversible.

Livestock grazing on hot desert lands also has associated budgetary costs. While total grazing fee revenues collected at the eight grazing districts responsible for hot desert allotments are sufficient to cover the costs of managing livestock grazing, the funds actually received by the Treasury are not sufficient to cover costs. Under current law, no more than 37.5 percent of the grazing fees collected are available to the Treasury to offset BLM livestock grazing management costs. The remaining fee receipts are returned to BLM for range improvements and to the states and counties from which the fees were collected to be used for such programs as roads, schools, and range improvements.¹ Furthermore, previous GAO reports have shown BLM's current level of spending is insufficient to perform all necessary range management tasks.

Historic Grazing Practices Reduced Hot Desert Lands Productivity

Livestock grazing practices of the late 1800s and early 1900s badly damaged desert lands in the Southwest. BLM officials and livestock operators whom we interviewed stated that the number of livestock grazing these lands during that time exceeded the number that the land could support. Overgrazing was one factor that precipitated several adverse changes to the desert areas. Important among these changes were an alteration in vegetative composition from a predominance of grass to shrubs and the onset of severe soil erosion.

¹Range improvement funds are used, in part, to rehabilitate land degraded by past grazing practices and to protect it from further damage.

Increases in shrub species, including mesquite bush and creosote bush, reduce the lands' ability to support native wildlife species and livestock. Overstocking, together with several years of severe drought in the 1890s, denuded thousands of square miles of productive grasslands in Arizona, leaving this area open to invasion by shrub species. Beginning in 1858, sporadic surveys of 31 New Mexico townships show that the ground cover was 75 percent grass.² A century later, less than 5 percent of the cover was grass; creosote and mesquite bushes were the primary replacements. Comparisons between lightly grazed areas and overgrazed areas suggest that overgrazing caused the vegetation replacements. Livestock operators whom we interviewed confirmed that they graze fewer livestock on desert lands now than were historically grazed on the land.

According to the 1981 report by the President's Council on Environmental Quality on the desertification of the United States, the destruction of native plants is quickly followed by excessive soil erosion. As one example, the report offers the Rio Puerco basin area in New Mexico. By the 1870s, approximately 240,000 sheep and 9,000 cattle grazed in the Rio Puerco basin. In the late 1880s, water tables began to drop and large quantities of soil began washing away. Between 1885 and 1962, an estimated 1.1 billion to 1.5 billion tons of soil washed away from the basin. Although some scientists attribute the erosion primarily to a change in climate, others believe the problem was intensified by the damage done by livestock overgrazing. Other examples of livestock grazing's contribution to erosion exist throughout the southwestern United States.

Current Livestock Grazing Is Degrading Some Hot Desert Allotments

While livestock operators state that overgrazing occurred in the past, they believe that their long-term interest in remaining in ranching provides a strong incentive not to abuse the public lands available to them for grazing. However, we found evidence indicating that current grazing practices continue to degrade some lands. Range managers we interviewed in the field and at headquarters stated that poorly managed livestock grazing can degrade BLM lands. Relatedly, a November 1990 report by Interior's Office of Inspector General states that personnel in the Caballo Resource Area in New Mexico estimated that about 102,500 acres of land were degraded because key plant species were overgrazed, cattle distribution patterns were inadequate, and land was being grazed

²John C. York and William A. Dick-Peddie, *Arid Lands in Perspective: Vegetation Changes in Southern New Mexico During the Past Hundred Years*, ed. William G. McGinnies and Bram J. Goldman (Tucson, Arizona: The American Association for the Advancement of Science and The University of Arizona Press, 1969) pp. 157-166.

during the wrong season.³ Some areas were found to be void of native vegetation and to contain highly erodible and severely compacted soils. As a result, undesirable plant species were invading, and use by wildlife was limited.

Specifically, we found the following examples during our desert field visits and allotment file review:

- On a visit to a section of the Mojave in the Stateline Resource Area in Nevada, cattle were grazing in an area of an allotment that the district range conservationist believed was degraded (see fig. 2.1). He stated that the plants were being grazed too heavily and that the cattle should be moved to another area of the allotment to prevent further damage.

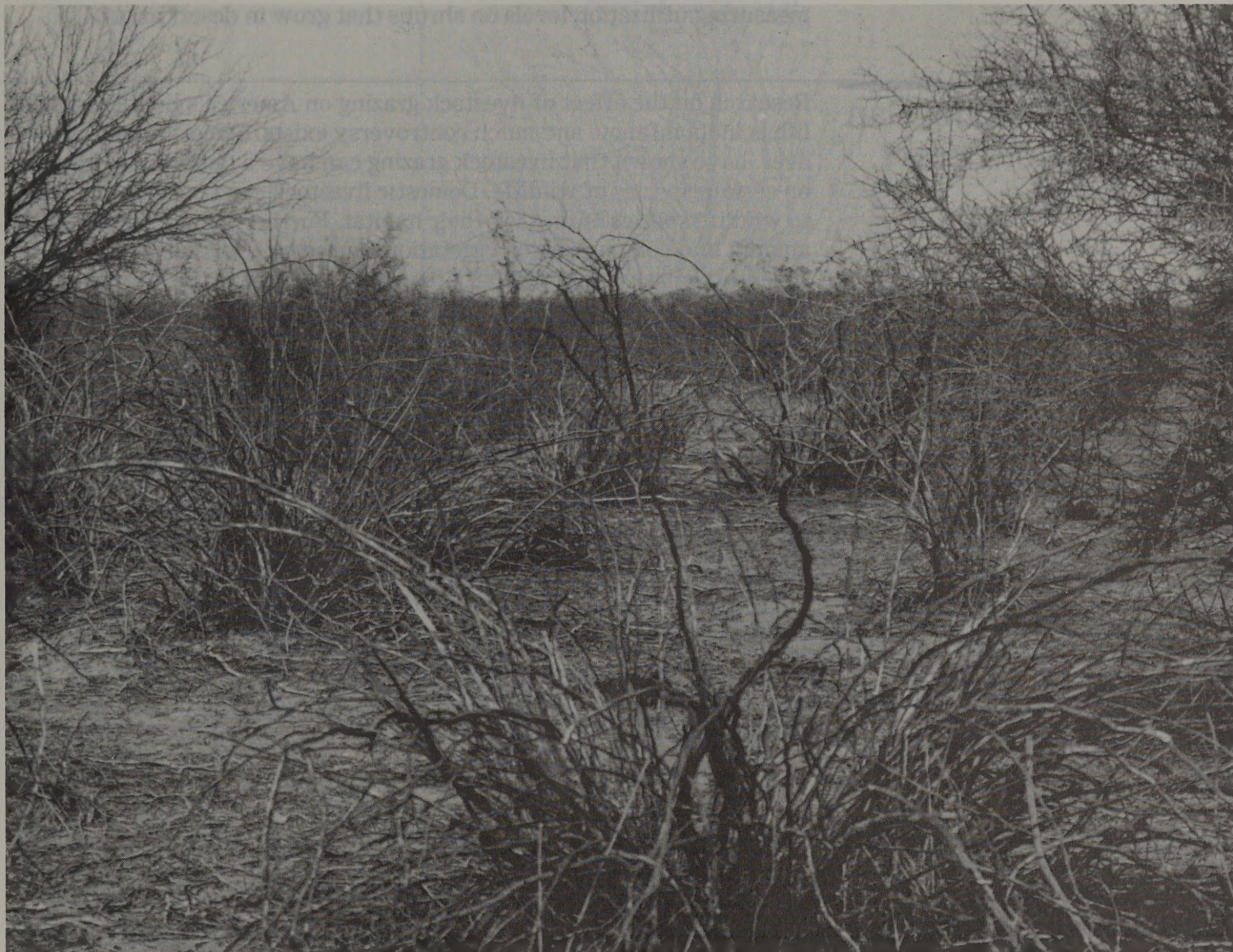
³Audit Report, Survey of Selected Programs of the New Mexico State Office, BLM, U.S. Department of the Interior, Office of Inspector General, Report No. 91-I-198, November 1990.

Figure 2.1: Degraded Grazing Area, Stateline Resource Area



- On a visit to a section of the Sonoran Desert within the Lower Gila Resource Area in Arizona, we observed creosote bush that the BLM botanist told us had been trampled by livestock trying to get at the small green plants growing at the base of each bush (see fig. 2.2). All vegetation around the bushes had been removed. The botanist also said that he had identified an endangered plant on the allotment the previous year and that cattle were trampling its habitat. The botanist believes that the allotment produces approximately 1 pound of usable forage per acre, whereas the prescribed number of cattle (160 yearlong) requires at least 64 times that much.

Figure 2.2: Trampled Vegetation, Lower Gila Resource Area



- A 1990 BLM evaluation of an allotment in the Shivwits Resource Area in Arizona indicated that the allotment is in a deteriorated condition. In one pasture, vegetative resource damage is readily apparent and long-term improper use has resulted in the near total elimination of perennial grasses.

When asked why improper grazing occurs, range conservationists cited a lack of staff to perform management tasks, especially the evaluation

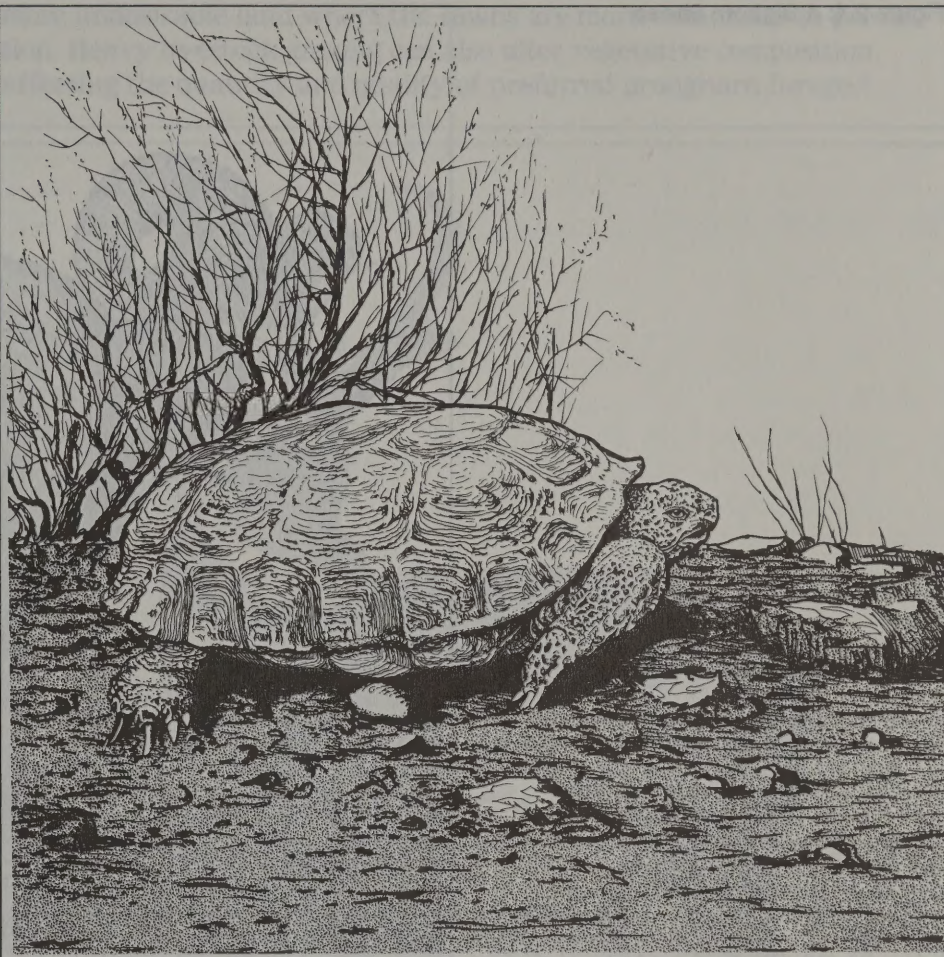
of monitoring data. Some range conservationists also noted difficulty in measuring utilization levels on shrubs that grow in desert areas.

Livestock Grazing Can Threaten Hot Desert Wildlife

Research on the effect of livestock grazing on America's hot desert wildlife is in its infancy, and much controversy exists. Some studies, however, have shown that livestock grazing can have a detrimental impact on certain species of wildlife. Domestic livestock can transmit diseases to wildlife species or destroy their habitat. Furthermore, changes in the amount and composition of vegetation caused by overgrazing can be detrimental to native wildlife that are unable to adapt to the alterations. The following are examples of the wildlife species that have been affected by livestock grazing:

- Mojave Desert Tortoise: Listed as a threatened species by the U.S Fish and Wildlife Service in parts of Utah in 1980 and in parts of California, Arizona, and Nevada in 1990, the Mojave desert tortoise (see fig. 2.3) has declined in numbers significantly in recent years. The 1990 listing document acknowledges that conclusive research is lacking but identifies domestic livestock grazing as one factor contributing to habitat degradation. Specific impacts include decreases in plant species important to tortoise diets, destruction of tortoise burrows through trampling, and reduction of cover needed to hide the tortoise from predators.

Figure 2.3: A Mojave Desert Tortoise



- **Bighorn Sheep:** Numerous studies have been conducted on the interrelationships between domestic livestock and bighorn sheep (see fig. 2.4), a species listed as threatened in California. Biological researchers widely accept that domestic sheep transmit diseases, which are potentially fatal, to bighorn sheep. Personnel of the California Department of Fish and Game attributed the loss of an entire herd of approximately 50 bighorn sheep in 1988 to pneumonia contracted after contact with domestic sheep. In Arizona, domestic sheep grazing is generally not permitted on BLM lands within 20 miles of bighorn sheep territory. Current research finds that cattle may also carry diseases fatal to bighorn sheep and that cattle use may cause bighorn sheep to avoid portions of their habitat.

Figure 2.4: A Bighorn Sheep



- Sonoran Pronghorn Antelope: The Sonoran pronghorn antelope (see fig. 2.5) is listed as an endangered species by the U.S. Fish and Wildlife Service and by the state of Arizona. The Arizona Game and Fish Department lists loss of habitat to domestic livestock grazing as one of the causes of the pronghorn's endangerment. Two researchers found that cattle can adversely impact the pronghorn's birthing process by inhabiting traditional birthing grounds.⁴ Fawning does are then forced to use

⁴McNay and B. W. O'Gara, "Cattle-Pronghorn Interactions During Fawning Season in Northwestern Nevada," ed. J.M. Peek and P.D. Dalk (Moscow, Idaho: University of Idaho Press, 1982), pp. 593-606.

more undesirable land where the fawns are more vulnerable to predation. Heavy livestock grazing can also alter vegetative composition, affecting the quantity and quality of preferred pronghorn forage.⁵

Figure 2.5: A Sonoran Pronghorn Antelope



⁵F. H. Wagner, "Livestock Grazing and the Livestock Industry," in *Wildlife and America*, ed. H.P. Brokaw (Washington, D.C.: U.S. Government Printing Office, 1978), pp.121-145.

J. Wald and D. Alberswerth, *Our Ailing Public Rangelands* (Washington D.C.: National Wildlife Federation, 1989).

J. Ellis, *Observations on Pronghorn Population Dynamics*, Antelope States Workshop Proceedings 5:55-65, 1972.

V. W. Howard, et al., *Roswell Pronghorn Study* (New Mexico State University, 1983).

- Mearns Quail: One study, by an Arizona Game and Fish Department biologist, found that domestic livestock grazing affects Mearns quail (see fig. 2.6) populations once it has reduced forage by more than 55 percent.⁶ At that level, quail populations are virtually eliminated because they can no longer find cover from predators.

Figure 2.6: A Mearns Quail



Proponents of desert livestock grazing state that livestock grazing can be beneficial to wildlife. They point to operators' maintenance of water for livestock as essential to some wildlife species' existence and express the view that some wildlife species, particularly deer and antelope, have increased in population. However, wildlife biologists, both inside and

⁶Richard L. Brown, "Effects of Livestock Grazing on Mearns Quail in Southeastern Arizona," Journal of Range Management, Vol.35, No. 6 (Nov. 1982), pp. 727-732.

outside BLM, believe that many desert wildlife species could survive on natural water sources. Also, as we noted in a previous report,⁷ state wildlife officials indicate that populations of some game animals are stable or increasing slightly (from record lows at the turn of the century) and that some species that adapt well to disturbed areas, such as starlings, are doing well. They point out, however, that other nongame species dependent on specialized habitat, such as the desert tortoise, are not faring well.

Research Demonstrates That the Potential for Hot Desert Lands to Recover From Grazing Activity Varies

One of the most controversial issues concerning livestock grazing's impact on hot desert lands is whether the removal of livestock will initiate recovery of native desert ecosystems. Some argue that because desert soils have been destroyed, recovery is unlikely until major climatic changes restore desert soil layers. Others argue that although recovery may take decades, or even centuries, removing livestock can start to restore the deserts.

Perhaps the most comprehensive assessments of the effects of discontinuing livestock grazing throughout the hot deserts are contained in EISS prepared by BLM between 1978 and 1989. These statements indicate that if livestock grazing were discontinued, recovery would begin. They agree that less soil erosion would occur, water infiltration would increase, and soils would generally improve. Vegetation would gain health and vigor, and cover would increase, benefitting both soil and wildlife. Wildlife habitat would improve for numerous species, including desert tortoises, pronghorn antelope, bighorn sheep, mule deer, and quail, as well as rabbits, amphibians, and rodents.

Other long-term studies show varying results. For example, the U.S. Geological Survey's 1-1/2-square-mile Desert Laboratory in the Sonoran Desert has not been grazed since 1907. While some of its study plots show improvement, no consistent changes have taken place in the types of vegetation on the plots. In another case, livestock were removed from the National Park Service's Organ Pipe Cactus National Monument, also in the Sonoran Desert, sometime between 1978 and 1979. A comparison of lands at three springs in the monument from 1975 to 1984 showed

⁷Public Land Management: Attention to Wildlife Is Limited (GAO/RCED-91-64, Mar. 7, 1991).

remarkable improvement in plant cover and density.⁸ However, little change was evident in the hillsides adjacent to one spring. A second assessment by the researchers in 1988 showed even further increases of plant cover for both perennial and ephemeral species. Researchers believe that the increased cover of living and dead ephemeral plants may significantly reduce soil erosion.

We visited several sections in the Mojave Desert from which livestock have been excluded for 10 to 18 years. The accompanying BLM biologist pointed out varying changes. At some locations plants were more diverse and vigorous inside the area from which cattle have been excluded than outside the enclosure. At other locations the differences were less apparent. The biologist pointed out that the impact of eliminating grazing had been minimized by two factors: (1) unauthorized grazing inside the enclosures and (2) a 5-year drought in the Mojave Desert that had precluded substantial growth of any kind, either inside or outside the enclosures.

Desert Livestock Grazing Costs More to Manage Adequately Than Is Generated in Grazing Fees

Livestock grazing on hot desert lands has budgetary costs as well as environmental costs. We found that the grazing fee revenues available to the Treasury to offset livestock grazing management costs are insufficient to cover these costs. Furthermore, as previous GAO reports have concluded,⁹ the resources that are currently spent on range management are not adequate to perform all tasks necessary to restore land damaged by grazing.

In fiscal year 1989, BLM spent \$4.6 million on range management in the eight districts that administer hot desert allotments. According to BLM estimates, approximately \$2.8 million was spent specifically to manage

⁸Peter L. Warren and L. Susan Anderson, Vegetation Recovery Following Livestock Removal Near Quitobaquito Spring, Organ Pipe Cactus National Monument, Cooperative National Park Resources Studies Unit, University of Arizona, Technical Report No. 20 (Tucson, Arizona: University of Arizona, Jan. 1987).

⁹Public Rangelands: Some Riparian Areas Restored but Widespread Improvement Will Be Slow (GAO/RCED-88-105, June 30, 1988).

Rangeland Management: More Emphasis Needed on Declining and Overstocked Grazing Allotments (GAO/RCED-88-80, June 10, 1988).

Rangeland Management: BLM Efforts to Prevent Unauthorized Livestock Grazing Need Strengthening (GAO/RCED-91-17, Dec. 7, 1990).

Rangeland Management: Current Formula Keeps Grazing Fees Low (GAO/RCED-91-185BR, June 11, 1991).

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livestock grazing. Grazing fees collected from these eight districts for the 1989 grazing year (March 1989 through February 1990) totaled about \$4.0 million. Under current law, however, the Treasury retains a maximum of 37.5 percent of the grazing fee collections.¹⁰ The remainder is either channeled back to BLM specifically for expenditure on range improvements (50.0 percent) or distributed to state and county governments (12.5 percent). Table 2.1 shows the grazing year 1989 fee collections, by district, as well as the way in which these monies would have been distributed to various accounts if the Treasury had retained the maximum 37.5 percent of revenues collected for grazing on all land within the districts.

Table 2.1: Grazing Year 1989 Grazing Fee Collections and Distributions

Dollars in thousands

District	Grazing fee collections (100.0%)	Maximum to the Treasury (37.5%)	Range improvements (50.0%)	Minimum to local government (12.5%)
Arizona Strip	\$251	\$94	\$126	\$31
California Desert	128	48	64	16
Dixie	43	16	21	5
Las Cruces	1,471	552	735	184
Las Vegas	181	68	91	23
Phoenix	477	179	238	60
Roswell	1,177	441	589	147
Safford	240	90	120	30
Total	\$3,968	\$1,488	\$1,984	\$496

Note: Totals may not add because of rounding.

Source: GAO analysis of BLM data.

As table 2.1 shows, a maximum of about \$1.5 million was available to the Treasury to offset livestock management costs. Table 2.2 shows that costs incurred totaled almost \$2.8 million, resulting in a shortfall of about \$1.3 million.

¹⁰The amount retained by the U.S. Treasury varies, depending upon the administrative authority under which the land is managed. For some lands, the Treasury receives 37.5 percent of the grazing fee collections, for some it receives 25 percent, and for the remainder it receives no revenues.

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Table 2.2: Grazing Year 1989 Revenues Available to the Treasury to Offset Livestock Management Costs Compared With Fiscal Year 1989 Management Costs

Dollars in thousands

Districts	Maximum available to offset management costs	Livestock grazing management costs	Difference
Arizona Strip	\$94	\$283	\$(189)
California Desert	48	270	(222)
Dixie	16	61	(45)
Las Cruces	552	727	(175)
Las Vegas	68	238	(170)
Phoenix	179	477	(298)
Roswell	441	439	2
Safford	90	294	(204)
Total	\$1,488	\$2,789	\$(1,301)

Source: GAO analysis of BLM data.

Critics of livestock grazing could argue that the costs of managing livestock grazing (\$2.8 million) exceeded the funds available to the Treasury to offset these management costs (\$1.5 million). Proponents could counter that the \$4.0 million collected in grazing fees more than offset the \$2.8 million in management costs and provided funds for state and county projects as well as for range improvements.

No matter how costs are analyzed, the resources currently being spent on range management, as earlier GAO reports have shown, are insufficient to perform all essential tasks. For example, we have pointed out that insufficient funding and staffing have been instrumental in BLM's inability to restore degraded riparian areas, deal with overstocked grazing allotments, and detect livestock grazing trespass. Consistent with our findings, BLM has concluded that its current budget is inadequate to perform all needed land management tasks throughout the public lands.

The Benefits From Grazing on BLM's Hot Desert Lands

The environmental and budgetary costs associated with domestic livestock grazing on BLM's hot desert lands must be weighed against the benefits derived from this activity. From an economic perspective, we found these benefits to be minimal. At a national level, the inventory of cattle and sheep on hot desert allotments in 1988, 1989, and 1990 represented no more than 1.6 percent and 3.0 percent, respectively, of total U.S. cattle and sheep inventories. At a local level, EISS prepared by BLM indicate that local economies in the hot deserts benefit little from livestock ranching. At an individual level, about 1,000 livestock operators hold grazing permits for hot desert allotments, and many of these operators generate little net income from livestock grazing. For these individuals, an important benefit of holding a BLM permit is largely noneconomic—the ability to maintain the traditional ranching lifestyle they enjoy. While unquantifiable, this value merits consideration as policies for using public lands in the hot deserts are being developed. Likewise, the noneconomic values of those who view the presence of large numbers of livestock in the desert as an impediment to their enjoyment of the desert public lands merit consideration.

The Number of Cattle and Sheep in Hot Deserts Is Small

The contributions of public lands grazing to the nation's beef and lamb industry are a subject of great debate. Some individuals claim that only 2 to 4 percent of the nation's beef supply comes from livestock that graze on public lands. Others state that 10 percent of all beef cattle and 20 percent of all sheep in the nation spend at least part of the year on public lands.

Because BLM does not maintain aggregate data on the number of livestock that graze on hot desert allotments in any given year, we obtained U.S. Department of Agriculture and state agriculture department livestock inventory statistics. We believe the actual numbers of cattle and sheep in the hot deserts are smaller than the numbers shown in tables 3.1 and 3.2 because the table data do not separate the livestock that do graze on desert public lands from the livestock that do not graze on public lands. Our calculations therefore incorporate an unknown number of livestock that did not graze on public lands in the deserts and overestimate the number of cattle and sheep on public lands hot desert allotments. These calculations are, however, consistent with the livestock industry's position that, because public and private lands are so intermingled, eliminating grazing on public lands would also reduce livestock grazing on private lands.

Chapter 3
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We compared the total number of cattle and sheep in all counties that had any BLM land that fell within the general boundaries of the three hot deserts (see fig. 3.1) with the total number of cattle and sheep in the nation. We found that for 1988 through 1990, the cattle inventory in these counties comprised no more than 1.6 percent of the entire U.S. cattle inventory. Similarly, no more than 3 percent of the national sheep inventory was located in the hot desert counties. Tables 3.1 and 3.2 show cattle and sheep inventories within hot desert counties, by state. Appendix II contains the calculations by county.

Figure 3.1: Hot Desert Boundaries Overlaid on Counties Included in GAO's Calculation of Cattle and Sheep Inventories

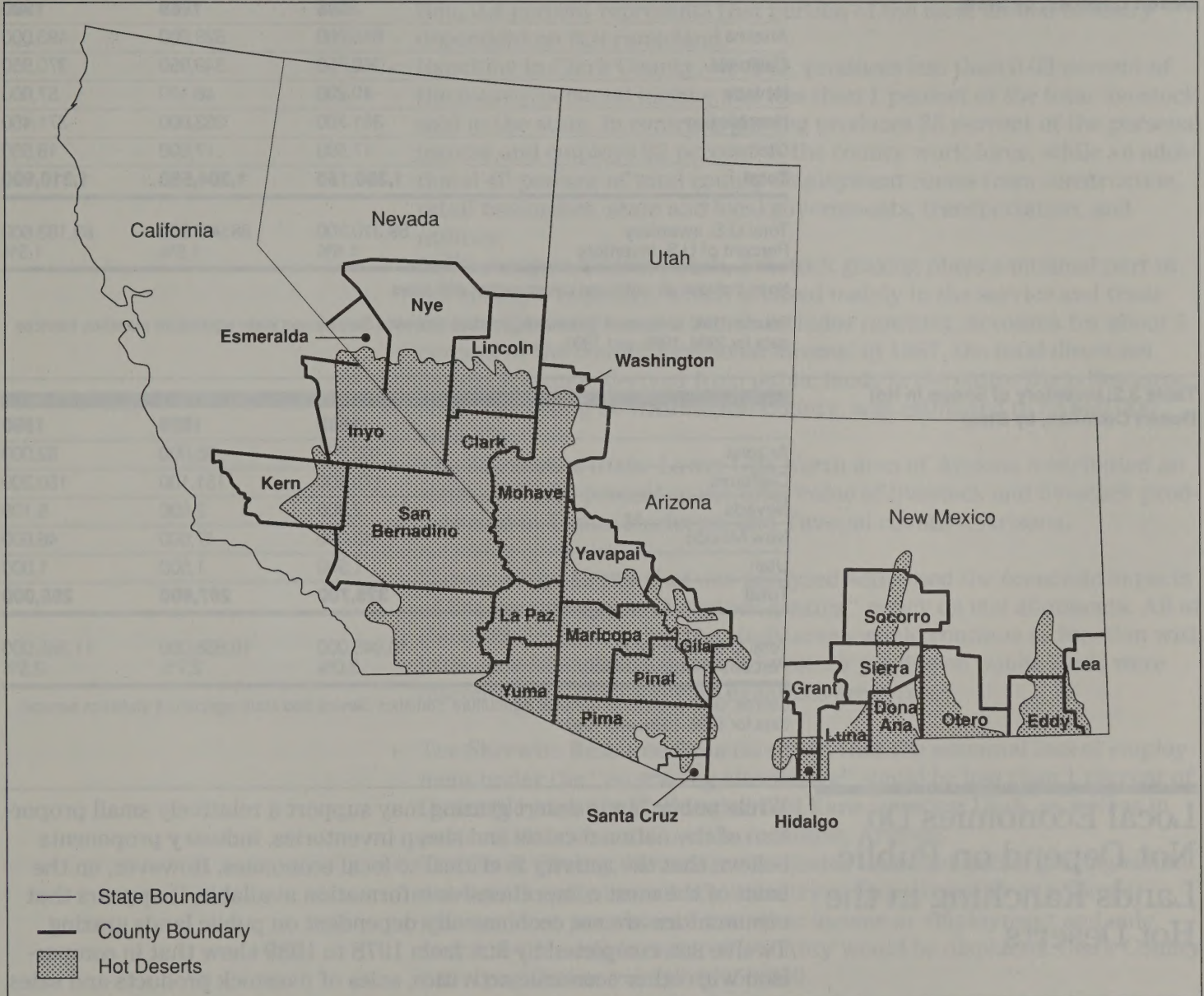


Table 3.1: Inventory of Cattle in Hot Desert Counties, by State

	1988	1989	1990
Arizona	610,000	528,000	493,000
California	360,750	349,950	370,950
Nevada	40,200	46,100	57,000
New Mexico	361,700	363,000	371,450
Utah	17,500	17,500	18,500
Total	1,390,150	1,304,550	1,310,900
Total U.S. inventory	89,310,300	88,967,900	89,188,600
Percent of U.S. inventory	1.6%	1.5%	1.5%

Note: Includes all cattle and calves except milk cows.

Source: GAO analysis of National Agriculture Statistics Service and state agriculture statistics services data for 1988, 1989, and 1990.

Table 3.2: Inventory of Sheep in Hot Desert Counties, by State

	1988	1989	1990
Arizona	102,000	95,000	82,000
California	176,400	151,100	150,300
Nevada	2,800	2,600	5,100
New Mexico	43,000	47,600	46,600
Utah	1,500	1,500	1,000
Total	325,700	297,800	285,000
Total U.S. inventory	10,945,000	10,858,000	11,368,000
Percent of U.S. inventory	3.0%	2.7%	2.5%

Source: GAO analysis of National Agriculture Statistics Service and state agriculture statistics service data for 1988, 1989, and 1990.

Local Economies Do Not Depend on Public Lands Ranching in the Hot Deserts

While public lands desert grazing may support a relatively small proportion of the national cattle and sheep inventories, industry proponents believe that the activity is critical to local economies. However, on the basis of the most comprehensive information available, it appears that communities are not economically dependent on public lands grazing. Twelve EISS completed by BLM from 1978 to 1989 show that in comparison with other economic activities, sales of livestock products and sales from ranching contribute little to the local economies in these areas¹. The EISS contained the following examples:

- In the Carlsbad Resource Area in New Mexico (consisting of Lea, Eddy, and southwest Chaves counties), meat animals make up 6.1 percent of

¹Livestock products are leather, meat, wool, and offspring (calves and lambs).

the dollar output of industries located in the resource area; of this fraction, 0.4 percent represents that portion of the meat animal industry dependent on BLM rangeland.

- Ranching in Clark County, Nevada, produces less than 0.03 percent of the county personal income and less than 1 percent of the total livestock sold in the state. In contrast, gaming produces 35 percent of the personal income and employs 32 percent of the county work force, while an additional 40 percent of total county employment comes from construction, retail businesses, state and local governments, transportation, and utilities.
- In Washington County, Utah, livestock grazing plays a minimal part in the county's economy, which is based mainly in the service and trade sectors. Farming income, which includes ranching, accounts for about 5 percent of the county's personal income. In 1987, the total direct net livestock income derived from public lands in the entire Dixie Resource Area, consisting of Washington County, was estimated to be \$50,000 annually.
- The 33 ranches in the Lower Gila North area of Arizona contributed an estimated 0.32 percent to the total value of livestock and livestock products sold in Yuma, Maricopa, and Yavapai counties, Arizona.

Eleven of the 12 EISS that GAO analyzed addressed the economic impacts of implementing a "no livestock grazing" policy on BLM allotments. All of these EISS indicated that the study areas would continue to function with little economic disadvantage if livestock grazing on public lands were discontinued. The following examples are typical:

- The Shivwits Resource Area EIS stated that the potential loss of employment under the "no grazing alternative" would be less than 1 percent of the employment in Washington and Kane counties, Utah, as well as in parts of Mohave and Coconino counties, Arizona.
- The Clark County, Nevada, EIS indicates that eliminating grazing would not significantly impact any industry or impact county or regional income. Most permittees have other income or employment and only four full-time employees in the county would be displaced. Clark County has a population exceeding 450,000.
- The EIS for the Las Cruces/Lordsburg Resource Area, which includes Grant, Hidalgo, Luna, and Dona Ana counties in New Mexico, showed that the resource area would suffer a 1-percent decrease in employment and a 0.7-percent decrease in total direct income.
- The EIS for the White Sands Resource Area (now called Caballo), consisting of Sierra and Otero counties in New Mexico, stated that resource area opportunities for employment in ranching would decline by about

20 jobs and total employment would decline by about 41 jobs. In 1980, there were 15,386 people employed in the resource area.

- The EIS for the southern region of the Lower Gila Resource Area states that the loss of ranch operations would not significantly impact the economy of the study area, consisting of Yuma, Pima, and Maricopa counties, Arizona.
- The EIS for the California Desert Conservation Area suggested that there is little potential for changes in grazing levels to affect the economic growth of the area.

Some livestock representatives believe that livestock grazing provides a large portion of the tax base to many local communities. However, livestock operators and cattlemen's associations did not supply any quantitative data to GAO to support this view.

Most Hot Desert Operators Realize Small Economic Returns

According to BLM records, about 1,000 livestock operators hold permits to graze livestock on hot desert public lands. The EISS point out that while most of these livestock operators are able to meet their costs, including depreciation and family labor costs, economic returns are small. Many livestock operators are able to continue ranching because they supplement their income with money from outside sources.

We analyzed earnings data for "typical ranches" presented in eight EISS covering resource areas with hot desert allotments. (The remaining four EISS that we reviewed did not contain earnings data.) These data do not refer to any individual ranch but are instead the best efforts by BLM and local livestock operators to represent the income realized by livestock operators in the resource areas. Table 3.3 shows the results of our review.

Table 3.3: Analysis of Income Realized by Typical Operations in the Hot Deserts

Size of operation	Large	Medium	Small
Number of livestock	300 or more	100–300	100 or fewer
Number of operators	165	191	312
Net revenue			
Positive	165	191	312
Negative	0	0	0
Net income			
Positive	155	110	139
Negative	10	81	173

Note: Net revenue = revenue minus cash costs

Net income = net revenue minus depreciation and family labor costs

Source: Data compiled from information in eight BLM EISS completed between 1978 and 1989.

Although 94 percent (155 of 165) of the typical large operations are able to realize a positive net income, only 58 percent (110 of 191) of the medium operations and 45 percent (139 of 312) of the small operations realize a positive net income. Furthermore, as the following examples show, the net income of many of the operations that make a profit is small:

- Data in the 1982 Lower Gila North EIS, consisting of Yuma, Mohave, Yavapai, and Maricopa counties, Arizona, show that small ranches (averaging 48 head of livestock) received a net income of \$2,599 and medium ranches (averaging 129 head of livestock) received a net income of \$4,347.
- In the 1985 Eastern Arizona EIS, primarily including Apache, Navajo, Yavapai, Maricopa, Pima, Pinal, and Cochise counties, Arizona, small ranches containing from 0 to 99 head of livestock received a net income ranging from \$1,083 to \$1,616. Medium-sized ranches containing 100 to 199 head of livestock realized a net income ranging from a loss of \$207 to a gain of \$3,872.
- Data in the Las Cruces/Lordsburg EIS, consisting of Grant, Hidalgo, Luna, and Dona Ana counties, New Mexico, show that, in 1980, ranches averaging 124 animal units (defined as a 1,000-pound cow or its equivalent) received a net income of \$2,278.

Noneconomic Value of Hot Desert Public Lands

Various groups place different noneconomic values on America's hot desert public lands. According to the EISS and livestock operators, despite the minimal economic benefits realized, the operators highly value the ability to maintain a traditional ranching lifestyle. Conversely, some people highly value the use of desert lands for purposes other than livestock grazing.

Statements, such as the following, about the noneconomic benefits realized by public lands livestock ranchers in hot desert areas, appeared in the EISS:

- Most livestock operators in the Cerbat/Black area of northwest Arizona would "stick to ranching till they went broke" and would remain cattlemen while subsidizing the ranch with income from other employment.
- Operators in the Las Cruces/Lordsburg, New Mexico, area appear to be motivated by a personal commitment to a ranching lifestyle and a "pioneer ethic."
- In Shivwits, Arizona, operators prefer ranching as a way of life, despite the small earnings and the need (for many) to supplement their income

with outside work. The main concern of many operators is to cover operating cash costs.

In conversations with us, livestock operators indicated that noneconomic incentives to maintain a ranching lifestyle were strong, and they affirmed their attachment to the land:

- One operator stated that ranchers can have good years and bad years economically. He has ranched at a loss for several years, and his livelihood is secured by other occupations, but ranching is "in his blood."
- Another operator has a permit for an ephemeral allotment that can only be used in years with adequate rainfall. His family income is supplemented by his wife's income from teaching. Notwithstanding the sporadic contribution of grazing to his family's livelihood, he said that he had a strong commitment to maintaining the ranching way of life.

The aforementioned examples show that the social benefits realized by hot desert livestock operators are at least as important as, if not more important than, economic considerations. Even though many people might not choose to continue operating a business that realizes little economic gain, livestock operators in the hot deserts receive compensation that cannot be measured in dollars and cents.

On the other hand, others believe that the presence of large numbers of domestic livestock detracts from the value of public land for environmental preservation and recreation. The value of these alternative uses of the public lands is not easily quantifiable. However, there is evidence that some people place a higher value on the use of public lands for the purpose of environmental preservation than the value reflected in grazing fees. The economic value of environmental preservation is, of course, not directly observable, but economists have developed ways of estimating such nonmarket values. To our knowledge, studies estimating the value of environmental preservation specifically in the hot deserts have not been conducted. However, some studies estimate the value of public lands for the enhancement of big game animals as higher than the value of the land for livestock grazing. For example, a study of rangeland in Challis, Idaho, estimated the value of an AUM at between \$5 and \$20 for enhancing elk and deer populations.² This is considerably higher than the \$1.97 per AUM the government currently charges ranchers for grazing livestock on the public lands. Furthermore, some environmental

²J. Loomis, D. Donnelly, and C. Sorg-Swanson, "Comparing the Economic Value of Forage on Public Lands for Wildlife and Livestock," *Journal of Range Management*, Vol. 42, No. 2 (1989), pp. 134-138.

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groups have exhibited a desire to protect the desert ecosystems by purchasing properties with federal grazing permits that they believe have suffered environmental damage as a result of overgrazing. These purchases demonstrate the willingness of some people to pay at least as much for environmental protection as ranchers are willing to pay for livestock grazing.

BLM Lacks Data to Ensure That Hot Desert Allotments Are Not Being Damaged by Livestock Grazing

Prudent management dictates that authorized grazing be limited to grazing that the lands can sustain. However, BLM is not collecting or evaluating the data needed to measure changes in rangeland conditions over time or to determine the proper number of livestock that would ensure that overgrazing does not occur. Inadequate monitoring has occurred primarily because of insufficient staff resources devoted to this task.

Since 1982, it has been BLM's policy to determine proper grazing levels through the use of monitoring studies. Current federal regulations state that changes in grazing preference shall be supported by monitoring studies (43 CFR 4130.6-3). Regulations (43 CFR 4160.2) also guarantee livestock operators the right to protest and appeal any change with which they do not agree. If the operator appeals the change, grazing use may continue at the current level until final action has been taken on the appeal except when an emergency requires immediate removal of the livestock to stop resource deterioration or when current grazing use is authorized by a temporary permit (43 CFR 4160.3(c)). According to BLM officials, if BLM believes a change in the livestock grazing level is necessary to prevent further degradation of the land, accurate monitoring data must be available to support the change throughout the appeal process. Furthermore, if these data are not available, BLM has to rely on the voluntary cooperation of the livestock operator to implement changes that the agency considers necessary. Should the operator not comply voluntarily, BLM must wait until sufficient data have been collected and evaluated to prove that a change is needed.

BLM Is Not Collecting the Data Needed to Determine Proper Grazing Levels

To make proper decisions concerning grazing levels, BLM must have data both on changes to rangeland conditions over time and on the role of livestock in effecting these changes. For many hot desert allotments, BLM has neither.

The Congress recognized the need to monitor changes in rangeland conditions over time and in PRIA required Interior to do this. BLM's monitoring guidance reflects this need and states that measuring changes in the characteristics of the rangelands is necessary to determine the effectiveness of current management and to evaluate progress toward meeting management objectives. Changes indicating a trend away from set objectives signal to BLM staff that adjustments in management, including a change in the number of livestock grazing, may be needed. However, responses to our questionnaire by 14 hot desert resource area offices showed that BLM is not monitoring changes in range conditions on

48 percent of the allotments in these areas. Our review of 81 hot desert allotment files at 10 BLM resource area offices showed that data are not being collected for 28 of 81 (35 percent) of these hot desert allotments. Without these data, BLM cannot assess the success or failure of the management plans in effect on these allotments.

In addition to monitoring changes in rangeland conditions, BLM needs quantitative data to determine proper preference levels. BLM guidance calls for collecting data on (1) the amount of forage consumed, (2) the number of livestock consuming the forage, and (3) climate conditions during forage consumption. Our work indicates, however, that BLM is not collecting these monitoring data on many hot desert allotments.

To maintain healthy range forage in the long term, consumption of the forage must be restricted. BLM generally believes that a 50-percent consumption rate will maintain the health of the range, although there are exceptions. By monitoring the amount of forage that is actually consumed and comparing it to the desired consumption rate, BLM can determine whether to adjust the number of livestock allowed to graze. Responses to our questionnaire showed that forage consumption data were not being collected on 47 percent of all allotments located in 14 hot desert resource areas. Our review of 81 hot desert allotment files showed that forage consumption data were not being collected on 27, or a third, of these allotments. Among these allotments, as the following examples show, are several that contain crucial habitat for wildlife species or areas that are considered environmentally sensitive:

- No monitoring of livestock grazing's impact is being conducted on a 450,000-acre allotment in California which has an active preference of 3,192 AUMs. According to resource area range staff, 40 percent of the allotment is crucial habitat for the threatened Mojave desert tortoise.
- No utilization monitoring is taking place on an allotment in Arizona that has been identified as having Mojave desert tortoise habitat, several threatened and endangered plant species, and competition for forage between domestic livestock and mule deer. In addition, BLM documents indicate that soil erosion problems are evident.

To determine proper grazing levels, BLM also needs to know the actual number of livestock that consumed the forage and the length of time they used the allotment. The most reliable method of determining the actual number of livestock that grazed an allotment is to count them from the ground or the air. According to BLM range conservationists, however, conducting actual animal counts is rarely done because of a

lack of staff. Instead, BLM primarily relies on livestock operators to provide counts of the livestock that grazed an allotment during the grazing season. However, for 32, or 40 percent, of the 81 hot desert allotment files we reviewed, livestock operators had not provided livestock counts. When calculating preference levels for the allotments for which these data are not available, BLM must substitute the number of AUMs authorized for the actual number of AUMs used. BLM's guidance warns that this substitution is not a good practice because permittees often do not use all of the AUMs that they are authorized to use and BLM may thus overestimate existing grazing activity.

The last type of information that BLM needs to determine the proper number of livestock is climate data. Accurate climate data, particularly precipitation levels, are important so that anomalies unrelated to authorized grazing levels can be explained. However, 32, or 40 percent, of the 81 hot desert allotment files we reviewed did not include climate data.

BLM Is Not Evaluating the Data Collected

BLM guidance requires that monitoring data be analyzed, interpreted, and evaluated to determine whether management objectives are being met and whether changes are needed. Responses to our questionnaire by 14 hot desert resource area offices showed that the data from 38 percent of the allotments for which monitoring data were being collected were not being evaluated. During our visits to 10 hot desert BLM resource area offices, we found the following examples:

- Data evaluations had not been completed for any of the 23 allotments being monitored in Nevada's Stateline Resource Area.
- Data evaluations had not been completed for the 15 hot desert allotments in California's Needles Resource Area. Furthermore, BLM documents indicated that monitoring and evaluation problems existed for 12 of the resource area's 15 allotments as early as 1985. An internal BLM review of these 12 allotment files showed that either data had not been collected or that the monitoring data gathered during the previous 10 years had not been analyzed or interpreted. At that time, BLM recognized that an analysis should be done to evaluate data that had already been collected and to ascertain what additional data were needed to set proper stocking levels. As of December 1990, no evaluations had been done.

Without proper evaluation of collected monitoring data, BLM does not know the impact of current grazing activity and is in no position to

change the number of livestock grazing on public lands. For example, we found that preliminary monitoring data collected for an allotment in Arizona indicated in 1983 that the number of livestock grazing exceeded the level that available forage could support. BLM decided to monitor the allotment for 3 years and issue a final decision on the basis of the data collected. Monitoring data continued to be collected, but no evaluation of the data was completed until 1991, despite the belief of the range staff and the wildlife biologist that the allotment was being damaged.

Staffing Levels Are Inadequate to Perform All Tasks Necessary to Properly Manage Livestock Grazing

BLM officials informed us that monitoring data were not being collected and evaluated on many allotments because staff were not available to complete all necessary range management tasks. In response to our questionnaire, over half of the hot desert resource area offices stated that staffing shortages and the need for staff to conduct other higher priority work had played a role in preventing allotments from being monitored and collected data from being evaluated. Our discussions with range staff confirmed these statements. Range officials told us that they were responsible for performing numerous tasks, including issuing grazing billings, facilitating land transfers, and identifying unauthorized grazing. Given this workload, monitoring often suffers. Furthermore, range conservationists are responsible for managing enormous areas of land and interacting with scores of permittees, as the following examples show:

- The Needles Resource Area in California has 2 range conservationists responsible for 2.4 million acres of land. There are 15 allotments in the resource area, all of which had grazing authorized in 1988 and 1989. The monitoring data collected have not been evaluated for any of these allotments. BLM identified lack of range staff and other higher priority work as the most important reasons for its not having completed these evaluations.
- The Mimbres Resource Area in New Mexico has 8 range conservationists responsible for 2.7 million acres of public lands. However, the lands are divided into 330 allotments, and each range conservationist is responsible for an average of 40 allotments. Because of the staff shortage, data are being collected only on the allotments that BLM has identified as being in unsatisfactory condition and having the potential to recover. No data are being collected on at least 196 allotments.

We also found that the number of full-time range conservationists in hot desert resource areas has decreased by over 20 percent from 1983 to

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1990. This decline has occurred even as BLM has determined that it needs to collect monitoring data—a labor-intensive task.

Conclusions and Matters for Consideration by the Congress

Conclusions

Livestock grazing has been, and will continue to be, a part of the western lifestyle. Moreover, domestic livestock grazing will remain one of many multiple uses of America's public lands. However, the experts we interviewed, the studies we evaluated, and the lands we visited provide enough evidence of the high environmental risk and low economic benefit associated with livestock grazing in America's hot deserts for us to conclude that the program as currently conducted merits reconsideration.

History has shown that uncontrolled livestock grazing can significantly reduce the productivity of desert areas, and we found that the hot desert lands and wildlife are still at risk of being harmed. Research demonstrates that the potential for hot desert lands to recover from grazing varies, but that recovery is possible in some areas, particularly those close to water sources. While recovery is generally a long-term process, this should not dissuade BLM from taking steps necessary to start on the road to that recovery. In addition to the environmental risks associated with livestock grazing hot desert lands, the grazing fees collected do not generate enough revenue to cover the costs of adequately managing the grazing program.

There is minimal economic return derived from domestic livestock grazing on BLM's hot desert lands. The cattle and sheep inventories in hot desert regions account for no more than 1.6 percent and 3 percent, respectively, of the national inventory. About 1,000 operators hold permits to graze livestock on BLM lands in the hot deserts, and many of them generate little net income from ranching public lands. Despite the minimal economic benefit realized by these ranchers, they value highly the ability to maintain a traditional ranching lifestyle. While this benefit cannot be ignored, neither should the values of other public lands users who believe grazing livestock is detrimental to the lands.

At current resource levels, BLM cannot manage the public lands to ensure that the number of livestock grazing is appropriate and that overgrazing is not occurring. Except for emergency situations, BLM can regulate the number of livestock grazing on allotments only by collecting and evaluating monitoring data and showing that an adjustment is necessary to protect the resource. Such collection and evaluation require many staff hours, which current staffing levels do not provide. Without an increase in staff resources, some allotments will remain unmonitored, and any adverse impacts of livestock grazing will go undocumented. Furthermore, some monitoring data that have been collected will not be evaluated.

Matters for Consideration by the Congress

The environmental risks, budgetary costs, minimal economic benefits, and management problems associated with livestock grazing on public lands in America's hot deserts raise questions about the merits of the hot desert livestock grazing program as currently conducted. Should the Congress choose to alter the program, GAO offers several options for consideration:

- Provide more funds for BLM to monitor livestock grazing in the hot deserts, recognizing that increased monitoring will lead to better livestock grazing decisions on more allotments. The resulting higher overall monitoring costs could be offset, at least in part, through an increase in grazing fees, which would provide greater revenues to the U.S. Treasury from this activity.
- Eliminate operators' preferences, thereby giving BLM the opportunity to adjust authorized grazing activity on hot desert allotments on the basis of the amount of forage actually available each season. While staff and budget requirements may not change, the risk to the environment should decrease as BLM seasonally adjusts the level of grazing.
- Discontinue livestock grazing in hot desert areas. This option would free the resources that BLM now spends to manage livestock grazing in hot deserts for use in other areas of the country where the environmental risks are lower and the productivity is higher. Some range resources would still be necessary in the hot deserts to protect against livestock trespass and to perform other duties.

Agency Comments and GAO Evaluation

The Department of the Interior generally agreed with the facts presented in our report and concurred that livestock grazing on hot desert public lands warrants congressional consideration. It did, however, comment that the report may create false impressions concerning potential cost savings if grazing were eliminated or substantially curtailed in the hot desert areas. We agree that range management entails more than just managing livestock grazing and that some range resources would still be necessary to perform other duties, even if grazing were eliminated in hot desert areas (see ch. 2).

Interior also noted that the three hot deserts are unique and should not be grouped together when addressing livestock grazing impacts. While we recognize the individual characteristics of each desert and describe them in detail in chapter 1, we believe that significant similarities among the deserts allow them to be grouped together when discussing livestock grazing management alternatives.

Finally, Interior commented that BLM is focusing its management efforts on the areas that provide the best dividends. While we agree that BLM has prioritized its allotments for management purposes, as noted in chapter 4, BLM is not monitoring the impact of livestock grazing on almost half of all allotments located in hot desert resource areas. With this number of allotments not being monitored and thus at risk of incurring potentially irreversible damage, we continue to question whether BLM is in a position to effectively manage the level of livestock grazing currently being conducted in hot desert areas.

In addition to its general observations, Interior commented on each of the options we presented for altering the hot desert livestock grazing program. First, Interior maintained that current funding of BLM's range management program was consistent with the President's budget and the range program's overall priorities. Furthermore, it noted that shifting or reallocating funds within the range management program from other areas to the desert areas for monitoring could potentially detract from the overall range program capability and have a negative impact on total program management. While such a shift could involve trade-offs, we believe that if grazing continues at current levels, the especially fragile nature of the desert ecosystems will require intensified management, including more monitoring. As one option, our report suggests that the Congress could increase the funds available to BLM for conducting necessary monitoring and further suggests that an increase in the grazing fee could provide greater revenues to the U.S. Treasury to offset higher overall monitoring costs.

Second, Interior disagreed with an option presented in a draft of this report, which suggested that all hot desert allotments be classified as ephemeral. As discussed in chapter 1, ephemeral allotments primarily consist of annual vegetation that must be regenerated each year from seed. Interior commented that this classification would not fully consider the nature of the resources because portions of the land, particularly the Chihuahuan Desert, comprise a perennial, rather than an annual, plant community. While this comment is technically accurate, the thrust of our option was that, given the variability of rainfall from year to year and the fragile nature of the hot desert ecosystems, BLM should be given the flexibility to adjust the number of AUMs to be grazed each season. We revised our suggested option accordingly.

Finally, Interior commented that the option of discontinuing livestock grazing in the hot desert areas did not consider that the intensity, rather than the mere act, of livestock grazing occurring in the desert areas is an

important factor in assessing the impact of grazing. While we agree with this comment, we point out in chapter 4 that BLM does not have the resources to properly manage the intensity of livestock grazing. As long as BLM's livestock management is restricted by a lack of resources, the option of discontinuing livestock grazing should be considered.

BLM Field Offices Included in Our Study 1988-1990

State	Year	Office	Area	Acres	Headcount
Alabama	1988	Alabama	Alabama	1,100,000	10
	1989	Alabama	Alabama	1,100,000	10
	1990	Alabama	Alabama	1,100,000	10
	1988	Alabama	Alabama	1,100,000	10
	1989	Alabama	Alabama	1,100,000	10
	1990	Alabama	Alabama	1,100,000	10
	1988	Alabama	Alabama	1,100,000	10
	1989	Alabama	Alabama	1,100,000	10
	1990	Alabama	Alabama	1,100,000	10
	1988	Alabama	Alabama	1,100,000	10
Arizona	1988	Arizona	Arizona	2,900,000	20
	1989	Arizona	Arizona	2,900,000	20
	1990	Arizona	Arizona	2,900,000	20
	1988	Arizona	Arizona	2,900,000	20
	1989	Arizona	Arizona	2,900,000	20
	1990	Arizona	Arizona	2,900,000	20
	1988	Arizona	Arizona	2,900,000	20
	1989	Arizona	Arizona	2,900,000	20
	1990	Arizona	Arizona	2,900,000	20
	1988	Arizona	Arizona	2,900,000	20
California	1988	California	California	16,000,000	100
	1989	California	California	16,000,000	100
	1990	California	California	16,000,000	100
	1988	California	California	16,000,000	100
	1989	California	California	16,000,000	100
	1990	California	California	16,000,000	100
	1988	California	California	16,000,000	100
	1989	California	California	16,000,000	100
	1990	California	California	16,000,000	100
	1988	California	California	16,000,000	100
Colorado	1988	Colorado	Colorado	1,000,000	10
	1989	Colorado	Colorado	1,000,000	10
	1990	Colorado	Colorado	1,000,000	10
	1988	Colorado	Colorado	1,000,000	10
	1989	Colorado	Colorado	1,000,000	10
	1990	Colorado	Colorado	1,000,000	10
	1988	Colorado	Colorado	1,000,000	10
	1989	Colorado	Colorado	1,000,000	10
	1990	Colorado	Colorado	1,000,000	10
	1988	Colorado	Colorado	1,000,000	10
Idaho	1988	Idaho	Idaho	800,000	10
	1989	Idaho	Idaho	800,000	10
	1990	Idaho	Idaho	800,000	10
	1988	Idaho	Idaho	800,000	10
	1989	Idaho	Idaho	800,000	10
	1990	Idaho	Idaho	800,000	10
	1988	Idaho	Idaho	800,000	10
	1989	Idaho	Idaho	800,000	10
	1990	Idaho	Idaho	800,000	10
	1988	Idaho	Idaho	800,000	10
Montana	1988	Montana	Montana	1,400,000	10
	1989	Montana	Montana	1,400,000	10
	1990	Montana	Montana	1,400,000	10
	1988	Montana	Montana	1,400,000	10
	1989	Montana	Montana	1,400,000	10
	1990	Montana	Montana	1,400,000	10
	1988	Montana	Montana	1,400,000	10
	1989	Montana	Montana	1,400,000	10
	1990	Montana	Montana	1,400,000	10
	1988	Montana	Montana	1,400,000	10
New Mexico	1988	New Mexico	New Mexico	1,200,000	10
	1989	New Mexico	New Mexico	1,200,000	10
	1990	New Mexico	New Mexico	1,200,000	10
	1988	New Mexico	New Mexico	1,200,000	10
	1989	New Mexico	New Mexico	1,200,000	10
	1990	New Mexico	New Mexico	1,200,000	10
	1988	New Mexico	New Mexico	1,200,000	10
	1989	New Mexico	New Mexico	1,200,000	10
	1990	New Mexico	New Mexico	1,200,000	10
	1988	New Mexico	New Mexico	1,200,000	10
Nevada	1988	Nevada	Nevada	1,100,000	10
	1989	Nevada	Nevada	1,100,000	10
	1990	Nevada	Nevada	1,100,000	10
	1988	Nevada	Nevada	1,100,000	10
	1989	Nevada	Nevada	1,100,000	10
	1990	Nevada	Nevada	1,100,000	10
	1988	Nevada	Nevada	1,100,000	10
	1989	Nevada	Nevada	1,100,000	10
	1990	Nevada	Nevada	1,100,000	10
	1988	Nevada	Nevada	1,100,000	10
Oregon	1988	Oregon	Oregon	1,000,000	10
	1989	Oregon	Oregon	1,000,000	10
	1990	Oregon	Oregon	1,000,000	10
	1988	Oregon	Oregon	1,000,000	10
	1989	Oregon	Oregon	1,000,000	10
	1990	Oregon	Oregon	1,000,000	10
	1988	Oregon	Oregon	1,000,000	10
	1989	Oregon	Oregon	1,000,000	10
	1990	Oregon	Oregon	1,000,000	10
	1988	Oregon	Oregon	1,000,000	10
Utah	1988	Utah	Utah	1,900,000	10
	1989	Utah	Utah	1,900,000	10
	1990	Utah	Utah	1,900,000	10
	1988	Utah	Utah	1,900,000	10
	1989	Utah	Utah	1,900,000	10
	1990	Utah	Utah	1,900,000	10
	1988	Utah	Utah	1,900,000	10
	1989	Utah	Utah	1,900,000	10
	1990	Utah	Utah	1,900,000	10
	1988	Utah	Utah	1,900,000	10
Wyoming	1988	Wyoming	Wyoming	900,000	10
	1989	Wyoming	Wyoming	900,000	10
	1990	Wyoming	Wyoming	900,000	10
	1988	Wyoming	Wyoming	900,000	10
	1989	Wyoming	Wyoming	900,000	10
	1990	Wyoming	Wyoming	900,000	10
	1988	Wyoming	Wyoming	900,000	10
	1989	Wyoming	Wyoming	900,000	10
	1990	Wyoming	Wyoming	900,000	10
	1988	Wyoming	Wyoming	900,000	10

BLM Field Offices Included in Our Study

Office	Visited by GAO
Arizona	
Arizona Strip District	
Shivwits Resource Area	•
Phoenix District	•
Kingman Resource Area	•
Lower Gila Resource Area	•
Phoenix Resource Area	•
Safford District	
Gila Resource Area	
San Simon Resource Area	
California	
California Desert District	•
Barstow Resource Area	
Needles Resource Area	•
Ridgecrest Resource Area	
Nevada	
Las Vegas District	•
Stateline Resource Area	•
New Mexico	
Las Cruces District	•
Caballo Resource Area	•
Mimbres Resource Area	•
Socorro Resource Area	
Roswell District	
Carlsbad Resource Area	•
Utah	
Cedar City District	
Dixie Resource Area	•

Cattle and Sheep Inventories by County, 1988-1990

Table II.1: Cattle Inventories by County, 1988-1990

	1988	1989	1990
Arizona			
Maricopa	141,000	133,000	129,000
Pima	40,000	43,000	39,000
Pinal	184,000	113,000	108,000
Other counties ^a	245,000	239,000	217,000
Total	610,000	528,000	493,000
California			
Inyo	19,750	22,950	22,950
Kern	194,000	179,000	198,000
San Bernadino	147,000	148,000	150,000
Total	360,750	349,950	370,950
Nevada			
Clark	7,500	6,100	15,000
Esmeralda	3,700	13,000	11,000
Lincoln	11,000	10,000	12,000
Nye	18,000	17,000	19,000
Total	40,200	46,100	57,000
New Mexico			
Dona Ana	20,600	21,000	21,000
Eddy	58,900	58,900	58,950
Grant	54,950	54,950	54,950
Hidalgo	43,950	43,950	46,950
Lea	46,100	46,100	50,000
Luna	42,800	42,800	42,900
Otero	23,900	23,900	24,900
Sierra	28,400	29,300	29,800
Socorro	42,100	42,100	42,000
Total	361,700	363,000	371,450
Utah			
Washington	17,500	17,500	18,500
Total	17,500	17,500	18,500
Total desert counties	1,390,150	1,304,550	1,310,900
Total U.S. Percentage	89,310,300 1.56%	88,967,900 1.47%	89,188,600 1.47%

^aOther counties include Gila, La Paz, Mohave, Santa Cruz, Yavapai, and Yuma.

Source: GAO analysis of National Agriculture Statistics Service and state agriculture statistics services data for 1988, 1989, and 1990.

Appendix II
Cattle and Sheep Inventories by County,
1988-1990

Table II.2: Sheep Inventories by County,
1988-1990

	1988	1989	1990
Arizona			
Maricopa	41,000	31,000	28,000
Pinal	27,000	36,000	26,000
Yuma	23,000	19,000	19,000
Other counties ^a	11,000	9,000	9,000
Total	102,000	95,000	82,000
California			
Inyo	1,400	1,100	1,100
Kern	155,000	130,000	129,400
San Bernadino	20,000	20,000	19,800
Total	176,400	151,100	150,300
Nevada			
Nye	1,800	1,900	2,500
Other counties ^b	1,000	700	2,600
Total	2,800	2,600	5,100
New Mexico			
Dona Ana	2,000	2,000	2,000
Eddy	20,500	22,000	21,000
Grant	100	100	100
Hidalgo	100	100	100
Lea	7,000	8,500	9,000
Luna	200	200	200
Otero	11,000	12,000	11,000
Sierra	100	200	200
Socorro	2,000	2,500	3,000
Total	43,000	47,600	46,600
Utah			
Washington	1,500	1,500	1,000
Total	1,500	1,500	1,000
Total desert counties	325,700	297,800	285,000
Total U.S.	10,945,000	10,858,000	11,368,000
Percentage	2.98%	2.74%	2.51%

^aOther counties in Arizona include Gila, La Paz, Mojave, Pima, Santa Cruz, and Yavapai.

^bOther counties in Nevada include Clark, Esmeralda, and Lincoln.

Source: GAO analysis of National Agriculture Statistics Service and state agriculture statistics service data for 1988, 1989, and 1990.

Comments From the Department of the Interior

Note: GAO comments supplementing those in the report text appear at the end of this appendix.



United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

4100 (221)

OCT 03 1991

Mr. James Duffus III
Director, Natural Resources
Management Issues
General Accounting Office
Washington, D.C. 20548

Dear Mr. Duffus:

This letter transmits our comments on the General Accounting Office (GAO) draft report entitled Rangeland Management: BLM's Desert Grazing Program Merits Reconsideration (GAO/RCED-91-209, dated August 1991).

We have reviewed the report and find that your staff has produced a report that is generally accurate in its facts concerning or related to the overall grazing program administered by the Bureau of Land Management (BLM) within the hot desert biomes. We concur that this is an appropriate matter for congressional consideration; however, we also believe that the report may be creating false impressions concerning potential cost savings if grazing was eliminated or substantially curtailed.

The three hot desert biomes are as different as they are similar. Grouping them together into one unit to address implications of livestock uses on these biomes can be misleading. For example, the Chihuahuan Desert has a larger proportion of perennial plants than the other hot deserts, making the conclusions less comparable. Even taking one desert and making overall assessments does not accurately reflect the individual sites and their vast differences.

The BLM has prioritized all the grazing allotments and focuses its management efforts on areas that will provide the best dividends, while limiting possible negative impacts from selective management. As a result, areas having the greatest potential to change and the most extensive problems or conflicts receive the most attention. Allotments that have the least potential to change may not be monitored and evaluated on a regular schedule; therefore, more intensive monitoring can occur on those allotments that are changing.

The range management program, as with other programs like recreation and wilderness, is managed to maximize public benefits, rather than to increase government revenues. While these recommendations warrant congressional consideration, the BLM will fulfill its present mandates by managing for multiple uses within the hot deserts.

The following are our specific comments on the GAO recommended options for congressional consideration:

GAO Recommended Option: Provide more funds to monitor livestock grazing in the hot deserts and provide more funds to BLM, through an increase in grazing fees.

Response: Presently, funding of the range management program within the hot desert biomes is consistent with the overall program priorities and is consistent with the President's budget. Shifting or relocating of funds within the range management program from other areas to the desert biomes could detract from overall program capability and have a negative impact on total program management. Major factors affecting the costs of managing livestock grazing are the size of the allotments, their accessibility, and their past uses, more than the biological community in which the use is occurring. Rangeland management consists of more than livestock grazing administration. An earlier study by the BLM indicated the costs of rangeland management even without livestock grazing would be about 40 percent of the current costs of management. These costs would cover activities such as inventory, monitoring, and resource protection.

See comment 1.

See comment 2.

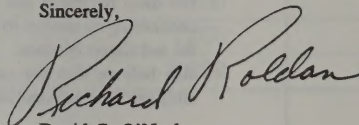
GAO Recommended Option: Classify all hot desert allotments as ephemeral, thereby eliminating operators' preference and giving BLM the opportunity to calculate and authorize grazing levels annually.

Response: Classifying the hot desert biomes as ephemeral as a basis for authorizing grazing on a yearly basis does not fully consider the resource. As the report states, the Chihuahuan Desert is comprised of a perennial plant community. Classifying this area as primarily ephemeral, when the vegetation community consists of primarily perennial vegetation, is inconsistent with the actual state of the resource. Further, not all of the area encompassed in the broad desert boundary maps is desert: it also includes forest land and some very productive rangeland.

GAO Recommended Option: Discontinue livestock grazing in hot desert areas.

Response: The intensity, timing, and duration of grazing are important in the magnitude of livestock grazing impact on the associated plant and animal resources. Proper grazing provides the most compatible livestock use with the resource and resource uses. An assessment of livestock use within the hot desert biomes should be related to this intensity of livestock use as much as to merely the use itself. Accordingly, we would object to this blanket exclusion policy. The appropriate level of livestock grazing should be determined area by area in a multiple-use management framework.

Sincerely,



FOR
David C. O'Neal
Assistant Secretary, Land and
Minerals Management

The following are GAO's comments on the Department of the Interior's letter dated October 3, 1991.

GAO Comments

1. We recognize that each of the hot deserts has unique characteristics and that grouping them together poses difficulties when addressing the implications of livestock grazing. However, we found more similarities than differences—each desert provides habitat for numerous threatened and endangered species, each desert receives variable rainfall and has been experiencing drought in recent years, in each desert ranching provides minimal economic return to livestock operators and local communities, and, perhaps most importantly, in each desert BLM lacks the resources to properly monitor the impact of livestock grazing on allotments. We believe that we fully described the differences and similarities between the three hot deserts in chapter 1 of this report.

2. We recognize that BLM has prioritized its grazing allotments and is focusing its management efforts on areas that provide the best dividends. However, we found that BLM is not monitoring the impact of livestock grazing on almost half of the allotments located in hot desert resource areas. This represents a substantial portion of the hot deserts ecosystems and leaves BLM in the position of not being able to change grazing management practices if necessary to protect the hot desert resources.

Major Contributors to This Report

Resources,
Community, and
Economic
Development Division,
Washington, D.C.

Bob Robinson, Assistant Director
Eileen Cortese, Evaluator-in-Charge
Isidro Gomez, Staff Evaluator
Mary Alice Hayward, Staff Evaluator

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